

# Solving Accounting Problems Using Excel for Windows

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# NOTE TO THE INSTRUCTOR

The exercises and problems associated with this text are provided as Microsoft Excel templates. The template format provides basic guidance in solving the exercises and problems and contains keys for account title placement, value placement, and formula placement. This format is intended to provide your students a structured environment to reduce the time required to accomplish the exercise or problem without reducing the academic challenge and opportunity afforded by the exercise or problem. Very few account titles and few account values are given in this format. Each student template contains an instructions worksheet and an area for the student to identify him or herself, the course, the due date, and the instructor. This identification information is printed at the top of each page if multiple pages are required by the exercise or problem. Each template is also set up with footers stating the exercise or problem identity, the page number of page numbers, and the time printed to assist in compiling the many pages you may receive.

Solutions for the templates are available as downloads from the Instructor's Resources web site. Each solution template contains the instruction sheet given to the student, the exercise or problem as given to the student, and the solution. The solution template matches the placement of data in the student template and closely correlates to the textbook solutions manual. This format is intended to assist you in the evaluation of the student's accomplishments without presenting an alternative to textbook presented methodology or solutions manual materials.

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# INTRODUCTION

Throughout the book numerous subjects are addressed. These subjects are intended to increase your ability and skills in using Microsoft Excel or most other spreadsheet applications in the accomplishment of academic and professional tasks. Many of the later chapter's sections assume that you fully understand and have mastered the skills presented in the earlier chapters. Because of this assumption, it is recommended that even proficient users of Excel read the book as they accomplish the assigned work.

There is a chapter dedicated to the Hewlett-Packard HP-12C Programmable Financial Calculator and another chapter dedicated to the Texas Instrument TI BA II Plus. These chapters address basic setup of the calculators, the time value of money, and days between dates issues.

The templates were constructed in Microsoft Excel XP. The files should be accessible from Excel 5.0 and Excel 95 up to, and including, the latest version of Microsoft Excel. The majority of commands and capabilities are common to many of the various versions of Excel as well as other spreadsheet applications.

The exercises and problems for the text are available for downloading from the web site. Each exercise or problem is identified with its own file name. For Exercise E1-12, the twelfth exercise within Chapter 1, the file name is e1-12 (Exercise, Chapter-Number). Problem P1-3A has the file name p1-3a (Problem, Chapter-Number) while problem P1-3B would be titled p1-3b. All of these files usually contain the extension ".xls" for Microsoft Excel unless otherwise stated.

Several of the chapters have additional data files associated with them to further show or demonstrate the capabilities of Excel. The data file associated with the "Paste" function would be titled as "Paste" for example while the data file for "Pivot Tables" would be "Pivot Tables". The title of the reference file will be clearly provided in the section.

Numerous screen prints have been included to clarify the presentation of the material. If you need assistance on a particular issue you can also accomplish the screen print function and take the document into the classroom, to your information technologies assistance center, or attach it to an email. To perform a screen print most reliably, first, open the application that you wish to receive the screen print. This application is usually Microsoft Word and will be used for the explanation. Then return to the application or screen that you want to screen print. Press the "Screen Print" key on the keyboard. This key is usually just above the Insert key on the keyboard but may be elsewhere on the keyboard. The image of the screen is now held in the Windows Clipboard. Reselect the receiving application, Word in this case, click into an open document to place the cursor and use the keystrokes Ctrl-V or click the "Paste" icon and the image should be pasted into the document. Now you can save the document as a file for later use and/or print it to show later or to document an event. Applications such as Microsoft Word, Windows WordPad, Windows Paint, Microsoft Excel, and Microsoft Access all accept screen prints. Windows Notepad does not accept screen prints.

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# CHAPTER 1

## CHAPTER OUTLINE

General  
Opening Excel  
Add-Ins  
Opening Excel Files

Demo Problem  
Pop-up Menus  
Drop-Down Menus  
New Workbook

## General

Microsoft Excel is a very powerful tool that is extremely easy to control. Exposure to Excel will be a growing process. The more you utilize Excel and become familiar with it, the more you will accomplish with it. It is recommended that a notepad be started to document useful information about Excel in an easy to find presentation. Various help screens can be printed for later reference. Placing notes about the issue addressed on the printout may be helpful later. Excel can be utilized to accomplish many of the exercises and problems throughout the textbook by creating your own workbooks and worksheets. Check with your instructor to ensure that Excel worksheets are acceptable for the accomplishment of exercises and problems where templates have not been provided. On the data directory, there is a “Forms And Worksheets” data file that contains basic accounting forms for your use.

## Opening Excel



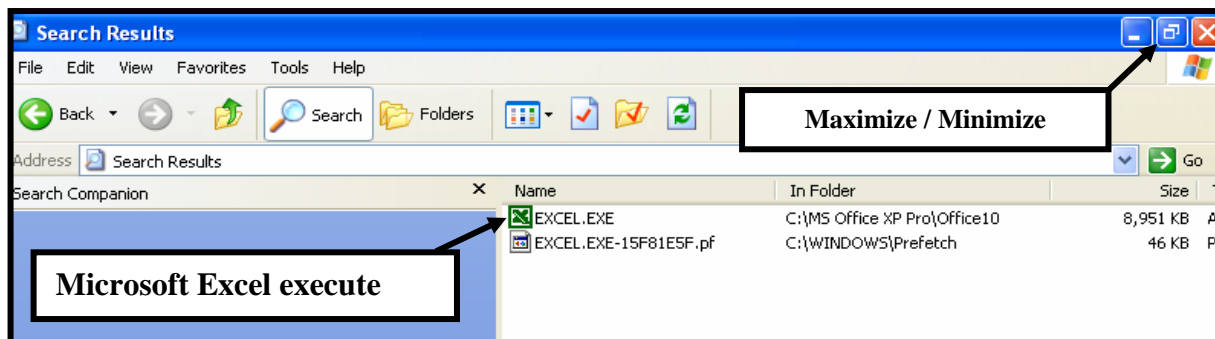
To open Microsoft Excel, double-click the icon on the desktop labeled Shortcut to Excel. If there is no icon, look for the Microsoft Office Shortcut Bar usually found at the top of the screen. You may also find the Excel execute file (.exe) by using Windows Explorer. To open Microsoft Windows Explorer, (not Microsoft Internet Explorer) double-click on the Windows Explorer icon on the screen. On a desktop system, single click on the “Disk C” line. If there is a plus (+) next to this line, click on the plus once to expose all folders/directories on the left side of the display. If Explorer fills the screen or prevents you from seeing the desktop area, use the Maximize/Minimize button



(two overlaying sheets) in the upper right corner to reduce its size. Follow the path of Start > Search and select the All Files or Folders option. This will invoke a pop-up dialog box. Within the text entry area labeled “All or part of a file name:” enter “Excel.exe” (Excel – period – exe) and click “Search”. Search should locate one or more files meeting the criteria. The target file is the file with the large green X in the box to the left of the listing. Single-click the left area (the "X" or the title area) of the one file with the large green "X," labeled “Excel” with the type of file identified as shortcut or application. Wait a moment then right-click and hold the right mouse button down. Now, with the right mouse button down, drag the mouse cursor to the desktop. When positioned over the desktop, release the mouse button. You will be given several options including “Create Shortcut(s) Here” from another pop-up menu. Select the “Create Shortcut(s) Here” option to create a new shortcut to Excel. Once the operation is complete, you should be able to double click this icon on your desktop to open Excel from the desktop.

## 2 Solving Problems Using Excel For Windows

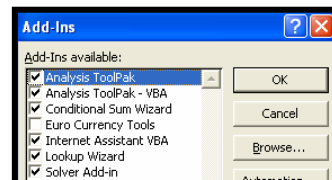
This is the presentation of Excel's execute file in Windows Explorer:



Note: If this is accomplished on a computer lab computer or a system that reverts to a default configuration upon each startup, this shortcut may not be available upon the next startup due to the reverting to the default setup.

### Add Ins

Excel has many functions and formulas that are not loaded by default to save memory. This is a simple procedure to insure that will ensure that all of the functions and capabilities of Excel addressed in this book are available to you on your system. Follow the path Tools > Add ins from the menu bar of Excel. The pop-up menu, which appears here, will give you numerous options. Select by ensuring that a checkmark is in the following selections, as shown – Analysis ToolPak, Analysis ToolPak VBA, Conditional Sum Wizard, Internet Assistant VBA (Optional but will increase the ability of “Help”), Lookup Wizard, and Solver Add-in. Once these are selected, click on “OK” to complete the process. The actual size of Excel will grow very slightly and it might take momentarily longer for Excel to load but neither are appreciable values. Once loaded into Excel, their capabilities will be available to every workbook and worksheet.

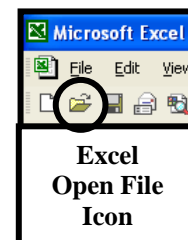


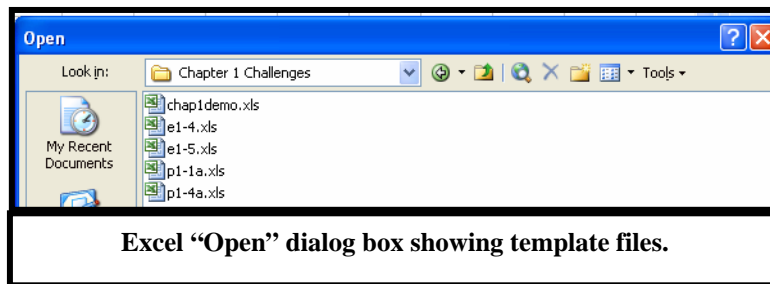
### Opening Excel Files

The templates can be copied from the computer media and saved to a local hard drive such as the “C” drive or hard drive.

**Note:** Do not do this procedure on a computer lab or networked computer. If the computer to be used is a computer lab or networked computer, the files should be copied to floppy disks in groups of 4~5 exercises, problems, or chapters to a floppy disk.

To open the template for Chapter 1, Exercise E1-4, file name e1-4, open Excel, click on the Open File icon (an opening file), follow the path File > Open, or utilize the keystrokes Ctrl-O (letter "O" for open in upper or lower case). When presented with the “Open” dialog box, use the drop-down arrow on the right side of the “Look In” window to expose all of the drives available. Locate and select the drive that contains the templates by clicking on the directory with the left mouse button. The displayed files will change to those of the templates directory. Use the slide bars on the bottom or side of the display to move the display until you locate the file titled e1-4. When located, double clicking the target file, e1-4, will open the file immediately without further action. Clicking it once will require the “Open” button on the right side of the dialog box to be clicked as well. The template will load automatically into the display.





To move around the template you can use the arrow keys, Page Up/Down, Tab, Enter or click the left mouse button while the cursor is over the target cell. Alphabetical characters or numerical values can be entered into a cell simply by typing them in. If an entry starts with an arithmetic function symbol (=, /, \*, + or -), preceding it with a single apostrophe (') will force Excel to read it as text. Otherwise, an error message may appear in the cell unless it is a proper formula.

To save the data, click the “Save” icon (a 3.5" floppy disk icon) on the toolbar, follow the path File > Save or utilize the keystrokes Ctrl-S. All of these actions will use the default location and name—where it was opened from and it’s opening name—to save the file. If you desire to save the file elsewhere or with a new name follow the path File > Save As. This will bring up the “Save As” dialog box and allow you to assign a new name and/or designate a new save location. This dialog box will also appear when you save a newly created workbook for the first time.

## Demo File

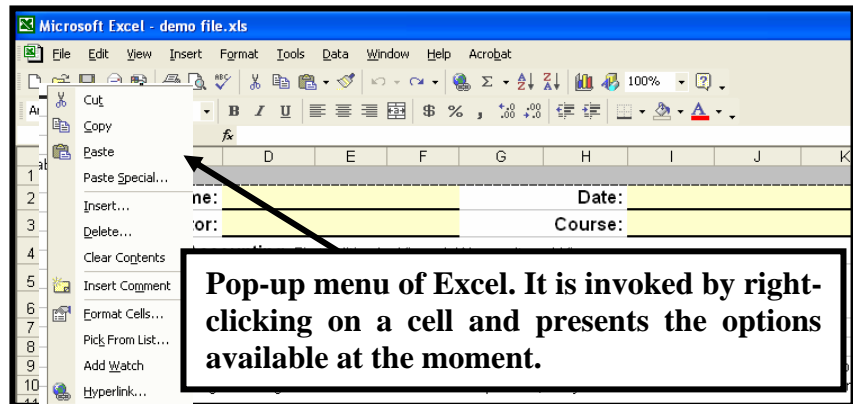
On the data disk there is a demonstration file of Excel basics. This file, titled “Demo File”, has quick and easy examples of how Excel can assist you in accomplishing the exercises and problems. The Demo File shows how the “Look-to” formula works and how it can be integrated into your work. Because you can do “add-ons” to the look-to formula you can utilize this to do math within the templates such as calculate the interest due on a note payable. It is suggested that you open this file, read both the Information and Instructions worksheets and then study the Demo File worksheet itself. This data file gives an example of a fully completed process of reading the presented material, entering it into a structured general journal, posting the transactions into a ledger, and then creating a trial balance. Very little of the data entry was accomplished through direct entry typing. The extensive use of the look-to formula also reduces the probability of keying errors. The templates have been set up slightly different than the textbook so that the look-to formula can be used extensive throughout the exercises and problem. This formatting provides much of the numerical data in cells that can be referenced by formulas. As such you will see breaks in the text to provide this data block or statement. Some exercises and problems are reworded and the numerical data is placed to the right of the text. Advanced formulas such as concatenate are utilized in the demo file. These are explained later in the book.

One of the features shown in the demonstration file is the split screen presentation of Excel. This is fully explained later in the book. It is a useful tool since you can maintain the presentation of the data of the exercise or problem in the upper pane while working in the bottom or vice versa. Each pane moves independently and you can reference or look-to the other pane while working. This feature will save time and allow you to maintain your orientation while solving the exercises and problems.

## Pop-Up Menus

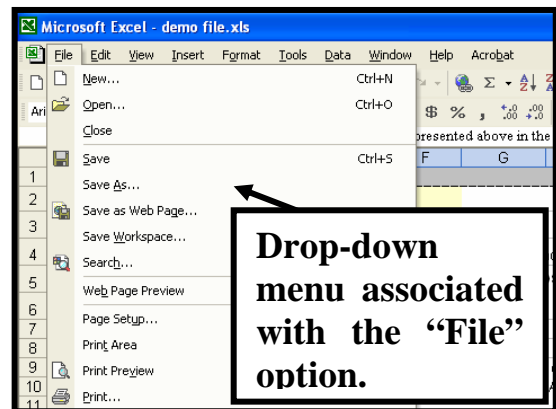
Excel will frequently respond to an action with a pop-up menu. This menu seems to appear out of nowhere and be anchored to nothing in particular. Usually it is associated with the currently active object. The most common pop-up menu is the one associated with the active cell, shown here:

This particular pop-up menu displays the most common commands for the active cell including cut, copy, paste, format cell, and insert comment. All of these commands are available through other paths but the action of right clicking the cell or range of cells to gain access to this pop-up menu is the quickest. Pop-up menus are not anchored to a specific item as drop-down menus are.



## Drop-Down Menu

The drop-down menu is visibly associated with another item such as the “File” title on the menu bar. The drop-down menu from the “File” menu, shown here, provides access to common file commands like New (workbook), Open or Close (a workbook), Save (a workbook) or the Save As function (for a workbook), Page Setup and Print Area. Many of these will be utilized in this text. Drop-down menus can be accessed by clicking on their titles or striking the “Alt” (Alternate) key and then using the arrows to move left and right between menus as well as up and down through the menus. Using your mouse to click or double click a choice or striking the “Enter” key will normally invoke the highlighted selection. Striking the “Esc” (Escape) key will normally back you out of the menu without any action taken. The appearance of the drop down menu from the “File” title on the menu bar is shown here.



## New Workbook

In the process of accomplishing your work with the templates you may want an area to do "scratch" work not to be incorporated into the finished template or file. This can easily be accomplished in the area outside the gray borders of the exercise or problem or by opening up a new workbook within Excel. To open the new workbook click once on the clear white sheet with the upper right corner folded over on the taskbar or follow the path File > New. Both will open the new workbook. Excel will normally assign the new workbook a title like “Book 2” or “Book 3” upon opening. To switch between the workbooks click on “Windows” on the menu bar and select the workbook you want to be active from the list at the bottom.

If more than can be displayed are available the last line will inform you of that and clicking on that line will display them. By using the Maximizing/Minimizing buttons near the upper right corner of the display and / or resizing the workbooks, you can have more than one workbook showing at the same time even if they overlap. The active workbook will come to the forefront of the display. All commands issued to Excel while two or more workbooks are open will only be effective on the active workbook. Commands such as copy, paste and format painting are available from one workbook to another while they are open. The title bar of Excel will reinforce the active workbook by showing the name.

# CHAPTER 2

## CHAPTER OUTLINE

Help  
Undo And Redo  
Command Access

Copying And Pasting  
Saving Excel Files  
Sum Formula

## Help

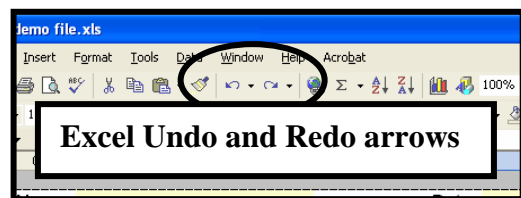
The Help menu of Excel is very useful and gives you several options. Each version of Excel has its own methodology of presenting help so one explanation will not address all situations you might likely encounter. Another method of attaining help within Excel is by pressing and releasing the F1 key, the standard help key in a Windows environment. The alternative option is to follow the path Help > Microsoft Excel Help from the menu bar. Both of these will present you with a dialog box or an office assistant. With this dialog box open, you can type in your question, problem, or desired action and click on “Search”, “Okay”, “OK”, or “Enter” as appropriate. When Excel presents you with a solution, you will need to evaluate it before implementing the proposed solution. If you like the solution, you can print it out for record keeping and reference later. If Excel cannot find an exact match, Excel may present you with several options to choose from. If Excel cannot find a match or has no idea of your question, it will ask that you rephrase the question. Your best responses come from active tense questions. If your first effort does not provide a reasonable response, try changing the question. For example, if you are trying to format a header, typing “Header” into the help menu will result in one array of options. However, entering “Format headers” will present a different array of options. An alternative is to change the plurals to singulars and the singulars to plurals in your query. The Microsoft homepage at [www.microsoft.com](http://www.microsoft.com) has additional help and assistance options. Some versions of Excel will ask if you want to continue your data search on the internet and the Microsoft homepage.

## Undo And Redo

With the versatility and power of Excel and the Microsoft Office products, errors are bound to occur due to the capability to manipulate data. When going to copy a cell and using keyboard commands of Ctrl-C, the keystrokes of Ctrl-V may be struck instead, resulting in a paste operation rather than a copy operation. To correct this event utilize the curling to the left blue arrow, the “Undo” arrow, on the task bar. Clicking directly on it will reverse the last action taken. This arrow can be clicked numerous times to reverse a series of previous events. There is a drop-down menu selection available with “Undo” through the small arrow pointing down just to the right of the symbol. With the selection of one of the events depicted you can reverse not the last event but an event that occurred 3, 4 or 5 errors ago. In older versions of Excel, the “Save” function will preclude undo’s from the period prior to the last “Save” operation.

“Redo” will reinstate an “Undo” action. This icon is a blue sweeping arrow to the right, a mirror image of the “Undo” arrow. It also has a drop-down menu associated with it to select prior events.

These two arrows/icons are shown in this screen print.





## Command Access

Excel has numerous command paths to accomplish almost every one of its many commands. The selection and utilization is up to you. If you are a proficient typist, you may select keyboard commands while typing and mouse commands while doing graphic tasks. Others will always select the mouse while some will use the “Alt” (Alternate) key path.

The most common method of accessing Microsoft Excel commands is through the mouse. With this concept, you would select a word on the menu bar by placing the mouse cursor over it and clicking on it. A drop-down menu attached to the menu bar would appear with the options available at that point in time and available in relation to that position on the worksheet. If an item is grayed out or faded, it is not available for some reason. You would then select the desired option by clicking on it with the mouse. If the option has an arrowhead pointing to the right or left, that selection has other choices available to it and selecting it or placing the cursor over that selection will result in an expanded display for that selection. Once shown, clicking on the desired option will result in its selection. If no selection is found, or you decide you are in the wrong path, clicking anywhere other than on the drop-down menu will back you out without a selection being activated. You may also press and release the “Esc” (Escape) key to cancel the menu and avoid a selection.

The second methodology of selecting commands is to use keyboard commands. With the use of a predecessor key such as the “Ctrl” (Control) key or the “Alt” (Alternate) key on the keyboard other options become available with additional keystrokes. For example, to copy something using keyboard commands, activate the cell or cells you would like to copy and then press and hold the Ctrl (Control) key down and then press and release the “C” key. This series of keystrokes is shown throughout the text as “Ctrl-C”. The shift key is not hit and it does not matter if the keyboard is locked into upper or lower case at the time. Once the “C” key is struck, the keys can be released in any order.

An alternative is to use the “Alt” (Alternate) key to access the menu bar. By striking this key you will see the first item on the menu bar become active. By using the arrow keys to move left and right as well as up and down, you can prowl the menu bar for your selection. When your selection is located, striking the “Enter” key will select and activate the command you have chosen.

Regardless of the method you have used to access the command structure of Excel, the “Esc” (Escape) key will usually back you out of the command path without making a selection. It may take one or more strikes of the “Esc” key to accomplish the back-out if you are several “layers” into a selection process.

## Copying And Pasting

Excel allows you to copy and paste both cells and data from within cells. Both of these functions can be used in accomplishing the tasks of the templates. The first function to be addressed is copying a cell. This function is accomplished by activating the cell you would like to copy. To do this, select it in any way you desire. The options are put your mouse cursor over it and click into it, use the arrow keys on the keyboard to move your current selected cell over to the desired cell, strike the tab key to advance the active cell, or strike the enter key to advance the active cell. When striking the enter key, the cursor will advance or move as controlled by the options set under the “Edit” tab of the Options dialog box. This tab can be found by following the path Tools > Options > Edit from the menu bar. The active cell can be identified by the heavy or accented outline such as cell 6 in the presentation here:

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

A range may be selected clicking in a corner cell of the square or rectangle and then by sweeping from that corner of the square or rectangle of cells to the opposite corner of the square or rectangle with the cursor while the left mouse button is being held down. It does not matter in which direction you sweep to select the range. In this example the range selected will be highlighted such as cells 25, 26 and 27 as shown here:

21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36

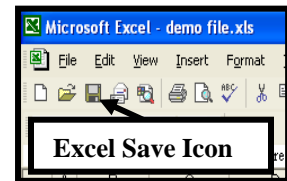
Once a cell or range of cells is selected, you can copy it by clicking on the two overlaying sheets of paper on the task bar, by right clicking the cell or cells and selecting the “Copy” command from the pop-up menu, or by following the path Edit > Copy. You can also utilize the keyboard command of “Ctrl-C”. When copied, the cell (or range of cells) is carrying its(their) formatting details with it(them). This feature is very convenient since you would normally want copied data to be presented in the same manner as the original presentation. The data is now in your clipboard and ready for pasting. Move your cursor to the desired pasting location and click on the clipboard icon on the task bar, right click on the cell and select the paste command from the pop-up menu, or follow the path Edit > Paste, you can also use the keystrokes “Ctrl-V” to paste the copied data.

If you selected more than one cell, the group or range of cells copied will be pasted in the same orientation as those from the upper, left most cell of the selection. When pasting, if you have selected to paste over a cell or range of cells containing data, Excel may not warn you that you are pasting over data. In this event, the existing data will be overridden by the paste operation. However, all may not be lost – you may be able to use the “Undo” command, addressed elsewhere in this book, to recover the data. When working with Microsoft Office XP or 2002 products such as Excel XP or Excel 2002, there may be more than one item on the clipboard at a time. To view the various items on the clipboard follow the path Edit > Office Clipboard and the items on the clipboard will be displayed. The clipboard function will hold up to 24 objects from any of the Microsoft Office products registered to the system so you can open up Microsoft Word, copy multiple items out of a document, open up Excel, and paste those items into Excel in any order you desire. The clipboard will retain its contents through save operations and, as stated, it displays all of the information from all of the registered products allowing it to be used as an import/export tool for multiple items.

A feature associated with “Copy” is the “Insert” function. The function is found under the path Insert > Copied Cells or by right clicking on a cell after the “Copy” command has been utilized. If a column, row, range, or individual cell has been copied, this feature will insert the copied cell or cells in relation to its shape and the target cell as instructed. If the positioning is not clear to Excel a dialog box may appear that asks if you want the copied cells inserted to “push” the existing cells to the right or down. Formulas associated with the copied cells will be relational unless they were absolute referenced in the source. (See Absolute Reference section elsewhere in the text on this matter.) If the copy command is initiated and not completed with a paste command, simply striking the “Esc” (Escape) key a couple of times will cancel the operation.

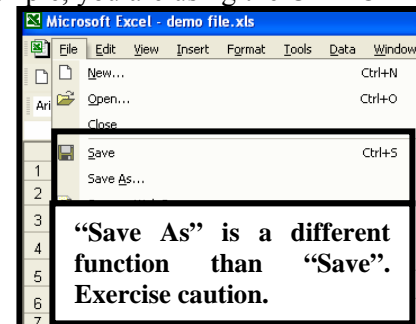
## Saving Excel Files

The motto of “Save early and save often” of days gone by of desktop computing are not lost with today’s increased reliability of computers, operating systems, and applications. Excel offers numerous ways to save a file. The most common method of saving is to simply click on the 3.5 disk icon on the task bar. This will save the file back to its original source making it easy to locate a second time or for later use. This may be done with the Excel templates accompanying this book if they have been copied to a recordable location from the CD-ROM format. You can also use the keyboard command “Ctrl-S” to invoke the save command. An alternative is using the menu bar path of File > Save.



When using “Save” the file is copied back to its original source in the original format. If either of these desires changes, you can impose that change on Excel. For example, you are using the CD-ROM as

your data source and you want to save your work on your hard drive, your “C” drive. By following the path File > Save As a dialog box is opened which allows you to change the location by modifying the presentation of the “Save in” box near the top of the dialog box, you can change the name of the file in the lower portion of the box through the “File name” window and you can change the type of file through the selection in the “Save as” type window at the bottom of the dialog box. These options give you great power over your data. You can open the file on a CD-ROM and save it to the hard drive, a network drive, or other storage devices you may have available. You can change the name from the default established by Microsoft Excel of “Book 1” or “Book 2” to a more desirable and descriptive title allowing relocating the correct file easier. You may also change its type to allow it to be opened by other, less sophisticated software packages or save it as an Excel template which is “read only” as discussed elsewhere in this text.



In selecting the name for the file there are a few special characters that cannot be used. These include most of the characters above the numbers on the keyboard and several others. The availability of characters is ample. It is also a good idea to date files that are used often. This allows you to simply back up and recovery from a previous point if something goes awry. For example, you are using Excel to keep your checkbook and each day you enter the checks and transactions into the file called “Checks”. By modifying the title to include Friday’s date each week you will retain the file in its previous week’s status even if this week’s file is lost. By using the dash or hyphen and spaces, legal characters within a file name within the Microsoft Windows environment, you can label the file “Checks 01-07-05” for the first Friday of January 2005. The following Friday using File > Save As you would modify the file name to “Checks 01-14-05”. The file “Checks 01-07-05” is still in the directory if “Checks 01-14-05” is no longer available for some reason. While you may have lost one week’s worth of data input, you have a defined point to recover from. If you are working on a professionally maintained IT system, your system administrator may be backing up your data for you. You should contact him or her to discuss the matter.

You can also change the file type to a text type, comma delimited, another spreadsheet format, or a multitude of other file types as shown in the drop-down menu from the “Save as type” window. Use caution when saving as non-Excel file formats since many of the features of Excel are not data or formatting features that can be saved into these data structures. Thus, when saving an Excel file as a text or document file, the formatting and tables within the file may be lost and not recoverable. In this case, it is best to save the file in its default Excel structure first and then save it in its alternate structure. Then, if editing is needed, it can be done within Excel and exported again as the specific data structure format.

When the save command is used Excel usually resets the “Undo” command. That is, if you conducted an event that could be reversed through the “Undo” arrow (addressed elsewhere in the book) the ability to recover through “Undo” is generally lost when you save the workbook.

## Sum Formula

The “Sum” formula of Excel is an easily understood tool. When the entry of data into a cell starts as “=SUM(” Excel is looking for a math function to follow. You can enter basic data as “=SUM(2+3+4)” and Excel will calculate the answer as 9. You can also reference cells such as the formula in cell J41 of the Demo file. This cell contains the formula “=SUM(I39-J40)”. This formula subtracts the value in cell J40 (\$40,000) from the value in cell I39 (\$50,000) to calculate the amount of capital paid-in in excess of par value for common stock for the entry, \$10,000. You must determine the appropriate formula to place into the cell and the appropriate references. The transaction states that the owner initiated business by buying 40,000 shares of \$1 par common stock with \$50,000 cash. The formula in cell I39 is a “Look-to” formula “=D14”, addressed elsewhere in this book. It simply references the cell D14 which contains the cash contributed, \$50,000. In cell J40 the formula determines the amount to be credited to common stock by multiplying the number of shares, a value contained in cell D12, by the par value of the shares, a value contained in cell D13. The result of this mathematical operation is \$40,000. Since you determined and placed the amount of cash contributed to the company in cell I39 through the “Look to” formula and you determined the value of the capital stock issued in the transaction in cell J40, the difference, the amount going to Capital paid-in in excess of par value for common stock is the result of subtracting the common stock value from the cash. This formula is “=SUM(I39-J40)” and results in \$10,000. This is what the formula in cell J41 does. There are other ways that formulas can be used to determine these values but subtracting the first of two credit values from the only debit value of the journal entry assures you that the debits will equal the credits within the journal entry. This does not guarantee you that the values are correct. That is part of the challenge of the exercise or problem.

With the “=SUM(” you must contain the formula with parenthesis marking the beginning and end of the formula run. You can also use parenthesis to contain and isolate the math operations precedent within Excel. Excel will do operations of multiplication and division before operations of addition and subtraction – “My Dear Aunt Sarah” as a memory clue. Therefore the formula =sum(3\*4+1) will result in 13. Excel reads and acts in the order of 3 multiplied by 4 and then 1 is added to the result of the multiplication operation. If you had wanted to multiply the sum of 4+1 by 3 the formula could be written as “=SUM(3\*(4+1))”, “=SUM(4+1)\*3”, or “=SUM((4+1)\*3)”. The result of this formula will be 15. The use of multiple or “nested” parentheses is common and accepted within Excel as it is in any other discipline of basic math operations. There is a maximum of 7 “nestings” within an Excel formula but you can reference one formula in another formula making the process rather large.

If the formula is simple you can shorten the sum formula to =3+4+5 and the result will be 12. In this case, Excel can understand the basic formula and the use of “SUM” to start the formula is unnecessary.

Excel will also mix constants with cell references within the formula. For example, in cell I71 of the Demo File is a formula that calculates the interest payable on the bank note. It takes the principle of the note, \$250,000, a value contained in cell D19, and multiplies it by the annual interest rate contained in cell D20, a value of 10%. Since the bank note was only out for a 6-month period, the additional factor of 6/12 is included in the formula to recognize a 6-month period of a fiscal year. This complete formula is “=D19\*D20\*(6/12)”. With this presentation of 6 months, it is reinforced why the multiplier is there within the formula. This technique will also preclude entering a 4-month period as 0.25 vise 0.33 as can occasionally happen.

Excel starts all addition, subtraction, multiplication, and division formulas with “=”. This lead-in is merely a trigger for Excel. If the sum function is used within an imbedded formula, the equal sign is not used. Imbedded formulas are shown in the general ledger balance columns of the Demo File. Examine

cell J126 to see an embedded formula. Embedded formulas are addressed later in the book. Notice that there are not equal signs within the formula. This placement would cause an error within Excel.

# CHAPTER 3

## CHAPTER OUTLINE

Freeze Panes  
Page Setup  
Page Break Preview

Print Area  
Print Preview  
Printing

### **Freeze Panes**

The “Freeze Pane” function is invoked on the Demo File upon opening. This function splits the single worksheet into two or four separately displayed panes. This view is controlled through the path Window > Split and, if invoked, Windows > Remove Split. To invoke a horizontally split screen presentation, place your cursor on the row numbers at the left of the display pane and click into it to make it active. Excel will highlight the entire row. Then follow the path Window > Split from the menu bar. Excel will split the screen horizontally and provide a scroll bar for each pane. In this manner the data from the exercise or problem can be read in one pane while doing journal entries in the other pane. To demonstrate a further enhancement of this function, set your upper pane to show rows 9 through 15 while showing rows 39 through 42 in the lower pane. You can recreate the journal entry by clicking into cell B39 of the lower pane and typing the “=” (Equal sign) (without the quotation marks), then click your cursor onto cell B9 of the upper pane. When you press and release the “Enter” key, “Tab”, or click into another cell, the date of “Jan 2” appears in the date cell of the journal entry, saving you time and reducing the risk of data error through typing. Since the account to be debited is Cash, you can do one of several things, you can type “Cash” into the debit account title area or you can do another “Look to” formula for the account title in the general ledger. Examination of the general ledger will show that the “Cash” account title is contained in cell B77 while the cash account number, used when posting, is in cell J77. So try the formulas “=B77” and “=J77” in the appropriate cells of the journal entry to preclude typing in those values. You can use the “=” sign and then simply click on the cell B77 or J77 to complete the formula if you desire.

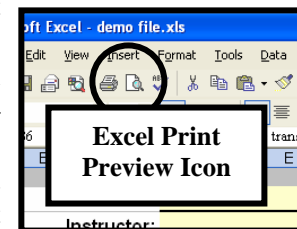
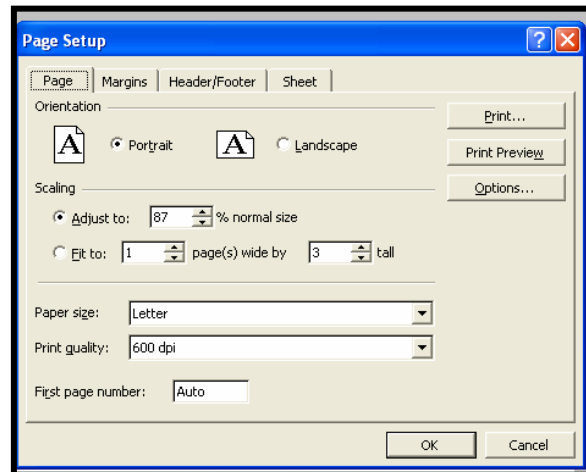
This capability of split screens is handy and precludes excessive scrolling and losing your place while working within the templates. If you place your cursor near to the center of the display and make a cell the active cell and then invoke “Freeze Panes” or “Split” screen, you will end up with four panes to deal with. In this case, the control of the display areas is interactive between the left & right and upper & lower panes through the scroll bars. Becoming comfortable with the appearance and proficient with the use of freeze panes or split screens greatly reduces your time to accomplish the tasks and reduces scrolling.

Once split screens are invoked, you can drag the border identifiers around to change their position and sizes.

## Page Setup

The printed presentation of Excel data is dependent on page setup and page break positioning. The access to the Page Setup dialog box can be accomplished through the path File > Page Setup. The dialog box the pops up appears here.

There are four tabs on this dialog box. The “Page” tab controls portrait or landscape view and the important function of “Fit to”. With the “Fit to” capability you determine the pages that your Excel worksheet will print by width and height. If you print a file only to find that one column of eight is contained on a second sheet, consider telling Excel to print to 1 sheet wide. You can always over guess the pages needed without penalty. For example, if you have four columns of 1” wide each and 40 rows approximating 0.25” in height each, you can instruct Excel to fit it to 10 pages wide and 20 pages tall and Excel will print the document on one single sheet since it is approximately 4 inches by 10 inches in size. If you set the “Adjust to” selection to a value such as 500%, Excel will obey that value and print the results. Taking your 4 columns and 50 rows and setting “Adjust to” to 500%, Excel will consume many sheets obeying your orders as the printed columns will be approximately 5” wide each (1” column X 500%) resulting in total columns width of approximately 20 inches in six and half inch width print area paper. The 40 rows are approximately one quarter of an inch each by default. When Excel multiples this value by 500% as instructed the sheet becomes approximately (0.25 inches X 40 rows X 500%) 50” long on a default print area approximately 9” long. So, you can expect a print out of approximately twenty inches wide in a print area approximately 6 ½” wide resulting in a print out approximately four pages wide. The length of approximately 50” will be printed in a print area approximately 9” long resulting in about 6 sheets in length. This single print out will consume approximately 24 sheets of paper – as instructed. Excel will obey the last choice selected between the “Adjust to” and “Fit to” options. Only one can be invoked at a time. “Print Preview” and then “Page Break Preview” can be accessed from this tab as well. Print preview can be accessed through the “Print Preview” icon.



The “Margins” tab controls the upper, lower, left and right margins as well as placement upon the page. By selecting the center horizontally and vertically, the data can be centered on the page for a very nice presentation, if appropriate. Seldom is financial data such as journals and ledgers centered both vertically and horizontally. The margins of the Excel templates has been defined as 1” top, bottom, left, and right. If your printer cannot handle this margin value you can adjust it through this tab.

The “Header/Footer” tab allows you to place header and/or footer information on each printed sheet. This capability is on each of the templates. The template data shows the file name, the worksheet name, the page of pages, the date, and the time. This has been included so that the compilation of multiple papers is easier. Click onto the “Header/Footer” tab and click on “Custom Footer”. The data contained within the footer will be shown. Holding your cursor over any of the numerous icons for several moments will reveal that icon’s function. There are numerous default headers and footers that can be utilized through the drop-down menus.

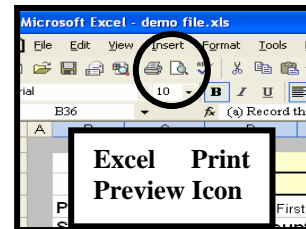
The “Sheet” tab contains numerous data bits that are very useful and versatile. The first bit of data is the established print area of the worksheet in the top data window. With the demo file this is B2:K176, or

in English, the print area starts at cell B2 and contains all of the cells through row 176 as well as all of the columns from B through column K. This tab also controls whether a specific row or set of rows will appear at the top of every sheet printed and if a specific column or set of columns will be printed at the left of each page printed. Assume that you are printing inventory reports running 125 pages. They contain part number, location code, description, quantity on hand, quantity on order, quantity in WIP, and value. By placing the titles row on each sheet through this function, you will retain column identity without building it into the worksheet. This feature is utilized in the Excel templates provided to put your identity and course data on each printed page if more than one page is used for the printed results to retain identity of the student and exercise or problem. This transposes to columns to identify rows as well. You may invoke columns and rows at the same time. Also on this tab, you can select the order in which the pages will print.

If you are printing data that is presented by rows and its taking four sheets wide by four sheets high, you may want to print the across and then down so that the first four sheets address the rows contained in the early rows before introducing the second set of rows presented on pages five through eight. Gridlines on the printed report, not the viewing screen are turned on or off through this tab. Many people do not like grid lines on their data. The templates have them turned off but this tab can change that for the individual template. This does not control the grid line presentation on the display. The grid line on the screen is controlled by the path Tools > Options > View. If viewed through that path, they will not print. Neither of these options affects cells that have borders placed on them.

## Page Break Preview

“Page Break Preview” is found through the path View > Page Break Preview from the menu bar or from a button on the Print Preview screen. The “Print Preview” icon is the white sheet with the folded corner and magnifying glass on the task bar shown here. “Page Break Preview” will show how the pages are going to print with the current printer and page settings. The page breaks can be moved and repositioned from within this view.



**Hint:** When resetting page breaks start in the upper left corner and work down and to the right if your print order as shown in the Page Setup is down and right. If the print order is across and then down, reset page breaks in that order. Each page setting affects the following pages so setting page 10 to an ideal presentation and then changing page 9 may cause Excel to reset your work and preferences on page 10. Starting at the bottom may also result in too much on page 1 or too little.

To close “Page Break Preview” follow the path View > Normal from the menu bar. “Page Break Preview” is dependent upon page setup and printer functions. Most printers, but not all, can print to ½” of each edge of an 8 ½ X 11” sheet of paper. There are printers that require larger than 1” margins.

**Tip:** The Excel templates for the exercises and problems provided on the computer media have been designed to provide the largest application usage so the standards of 1” margins are seldom violated.

## Print Area

As addressed previously, Excel can and will consume as much paper as instructed or needed (if left to default setting) to print a worksheet. Sometimes this is not necessary. For example, you have constructed a large worksheet computing the data but the actual data presentation is only one physical page. In construction of the worksheet you have identified various areas to clarify your calculations and work. Contained in these areas you have extensive detail and support material that are not required for the printed presentation. If not provided with parameters for printing, Excel will print in an 8 ½ X 11” format for standard bond paper a range from the upper left cell, usually cell A1 in a rectangular or square profile



through the further right and lowest cells with data entered. So, if you have data in cell A1, cell Z1, and cell A55, your print area may default to A1 through Z55. Some versions of Excel may trim the last page or two from the printout if there is nothing on that page, to the right of that page, or below that page. It is safer not to assume what Excel will and will not print by defining your print area. In your large worksheet example, all of your supporting calculations are going to be printed and the printing will normally be in a vertical then left to right format in portrait mode.

Redefining the print area is easily handled within Excel. The Demo File has a predefined print area to preclude this and can be used as an example. On the Demo File worksheet of the Demo File, you will notice that the worksheet is outlined by a gray border. This border has no function with the print area, it is merely provided by the author as a visual reference of the print area. Anything you enter inside the gray border will be printed on the sheet. Any item on or outside the border will not be printed on the worksheet printout. To examine the worksheet's predefined printed area follow the path File > Page Setup > Sheet and read the values contained in the upper window of the "Print" area tab. This value should be "B2:K176" or from cell B2 down and right through and including cell K176. If you know the print area you want, you can enter it directly into the print area window on the "Sheet" tab of "Page Setup" by using cell references and separating them by a colon. However, you can also define the print area from the worksheet itself. To demonstrate this, click into and make cell A1 of the demo file the active cell. When this is done the cell will have a heavy border around it. Now, press and hold the left mouse button down, while holding the left mouse button down, sweep the mouse cursor down and to the right to highlight all of the cells down to and over to the right to include cell L20. Once the cells are highlighted, release the mouse button and do not click back onto the worksheet or your highlight will be lost. Follow the path File > Print Area > Set Print Area and click on the "Set Print Area" option. Now you have defined the print area without entering data or keystrokes. Utilize the "Print Preview" button or icon, discussed elsewhere in this book, to see the redefined print area. Most of the Demo File is not available in the print version since your print data selection is from cell A1 through L20. Also, the gray borders are part of the print area. Close the Print Preview screen through the "Close" button and reset the print area by following the path File > Page Setup then selecting the "Sheet" tab and entering "B2:K176" into the "Print Area" window overwriting the "A1:L20" value. All of the Excel templates have the print area defined for reasonable presentation of the exercises and problems.

You can also print areas that are not adjacent to each other. For example, assume that you want to print the range from B2 through L50, and the range from R55 through Q90. Open up the "Sheet" tab of the "Page Setup" dialog box, click into the "Set Print Area" window, click into cell B2 on the worksheet and highlight down and right through cell L50, now type in a "," (Comma) to define and instruct Excel that you have identified the first area and are now identifying a second print area, then click into cell R55 and highlight through Q90 and click "OK". Excel will identify these two ranges in the window separated by a comma as "B2:L50,R55:Q90". You can define multiple ranges this way. Remember that after highlighting and identifying the first area, you must insert a comma. You can use the arrow keys and / or the scroll bars to move to the second, third, and following areas.

You cannot define one page to be printed portrait and another landscape within the same worksheet of Excel. Your solution to have one worksheet inside the workbook setup with landscape and the second worksheet setup portrait as the setup is to the worksheet, not workbook. Then simply have "Look to" formulas on one worksheet referencing the source worksheet so data does not have to be entered more than once. When this is accomplished, you can define how each worksheet will be printed without affecting the defaults and settings of the other worksheet. Once the first worksheet is printed, select the second worksheet and print it. You can also select through highlighting the first data and use the "Print Selection" option from the "Print" dialog box, accessed through the path File > Print. Then set the preferences as desired. Once the first page is printed, highlight the data for the second page and set your preferences through the "Print" dialog box by following the path File > Print and set the values and

presentation techniques you desire – including landscape for the second print run. It is best if you always preview the worksheet before printing to avoid paper consumption.

**Tip:** Once printed, review the document to insure that it is correct and complete. Just because a computer printed it does not establish or verify it's accuracy.

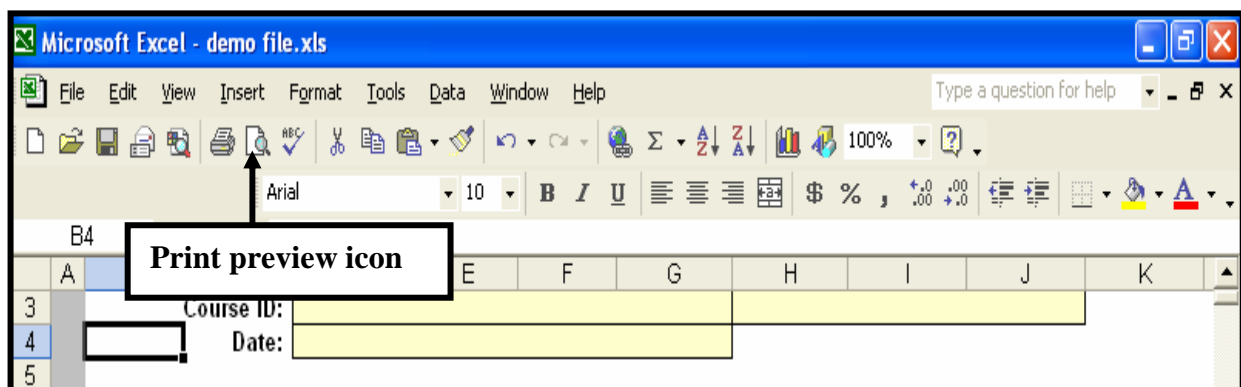
## Print Preview

By clicking on the “Print Preview” icon on the task bar, a white sheet of page with the upper right corner turned over and a magnifying glass overlaying it, you will access the print preview of your document. If there is more than one page, there will be a scroll bar on the right side of the screen. If the print preview presentation fills the page you are probably in the “Zoom” mode. Simply click on the sheet or on “Zoom” on the menu bar and you should be presented with an overall presentation of your document. If there is more than one page or it is larger than the screen you should have scroll bars to maneuver through the document.

**Clue:** In order for “Print Preview” to work, your system must have a printer installed in the operating system. The printer need not be available but Windows, Word, and Excel all provide “Print Preview” based in the defaults and settings of the currently selected printer.

From this screen you will see how the document will appear in its printed mode. This includes features such as headers and footers as well as margins. You can also adjust the page while in this presentation. By clicking on the “Margins” button at the top of the menu bar you will be given a presentation of current placement of the margins and columns. You can adjust the margins and column widths at this point by placing the mouse cursor on the margin or column marker and getting it to change to a double headed arrow and then pressing and holding the left mouse button down. While the mouse button is being held down, drag the cursor left, right, up, or down, as desired. The margins at the outer areas of the sheet at the top and bottom of the sheet are those of the page and are defaulted to the values found under the path File > Page Setup > Margins. These margins are fully adjustable but will usually be at or outside of the file margins. If the worksheet data is printed on top of the header and footer data, utilize this presentation to move the data margins off the header or footer margins. The area between the page margins and the file margins is where the headers and footers are placed at the top and bottom. The margins at the side of the sheet are those of the page and the file unless you have a page narrower than the file page. In that case, the file will be oriented into the upper right corner of the page.

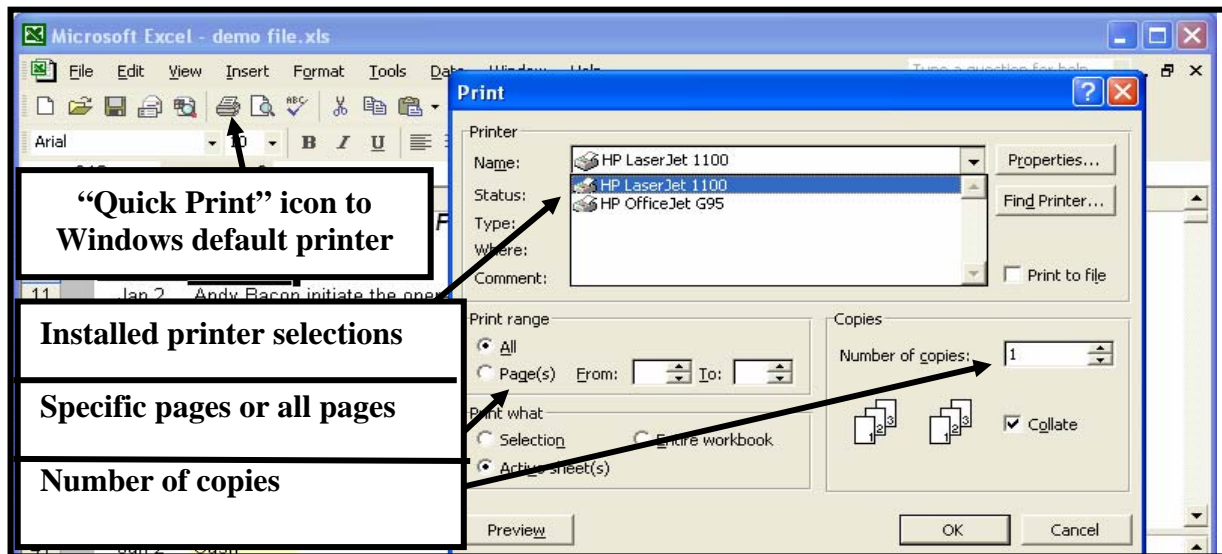
There are numerous changes you can make within print preview besides margins and column width. By clicking on the “Page Setup” button or icon you can adjust almost every item accessible through File > Page Setup. Some are grayed or faded out as they are not available at this time but selection the Page Setup dialog box through the path File > Page Setup will usually present them as these particular items must be set from the normal view mode or from the page break view mode. Remember that under the “Margins” tab within “Page Setup” you can center your page horizontally, vertically, or both if you desire.



## Printing

Excel will print from several different commands and paths. The quickest while using the templates is the “Print” icon on the task bar. This symbol is the “Printer”. By clicking on this icon, Excel and Microsoft Windows will print the currently active document utilizing the document settings under “Page Setup” through the default printer as established by the Windows Control Panel settings for printers. When printing other worksheets this command may result in excessive paper being used in the printing process. The difference is that the Excel templates accompanying this book already have predefined layouts and paper breaks. For original worksheets, the layout and print area should be verified and adjusted as described in the “Print Area” and “Print Preview” sections elsewhere in this book.

If you do not desire the Windows default printer you can follow the path File > Print and a dialog box, shown here, will appear:



From this dialog box, you can select printers installed on the desktop system, on the network, or fax drivers that may be installed. If your worksheet consists of multiple pages, you can select any relevant range of pages. For example, if your worksheet consists of five pages, you can select “All” to get pages 1 through 5, select from pages from 2 through 4, select from 3 to 3, or elect to print only the highlighted or selected area through the “Selection” within the “Print what” box below the Print range box. You can also determine the number of copies desired and whether those copies are collated or not. The default is to collate multiple prints. This may not be desired if presenting a large amount of information to a group as they may become involved in scanning the depths of the document during your presentation of page 1. By not collating the documents, you can pass single sheets out, containing exposure without having to resort the document. After all selections have been made, printing is initiated by clicking “OK”. Excel and Windows will normally print the document to the selected printer without further action.

# CHAPTER 4

## CHAPTER OUTLINE

Today And Now  
Formatting Cells

Formatting Within A cell

### **Today And Now**

Excel has two functions that will assist you in inserting current dates and times. By utilizing the function “=TODAY( )” Excel will present the date in the current default value for the worksheet. On January 1, 2005, this function would return 01/01/05 if that was the default of the worksheet and no other formatting had been applied to the cell. If the cell had been formatted to MMM D, YYYY format under “Custom” through the Format > Cell path the function would return Jan 1, 2005. Once the function is put into a cell, that cell can be formatted to present the date in the desired format.

**Tip:** This function does not present time correctly. Excel makes a distinction, correctly, between “Today” and “Now” in the same manner as the timeline for mowing the lawn.

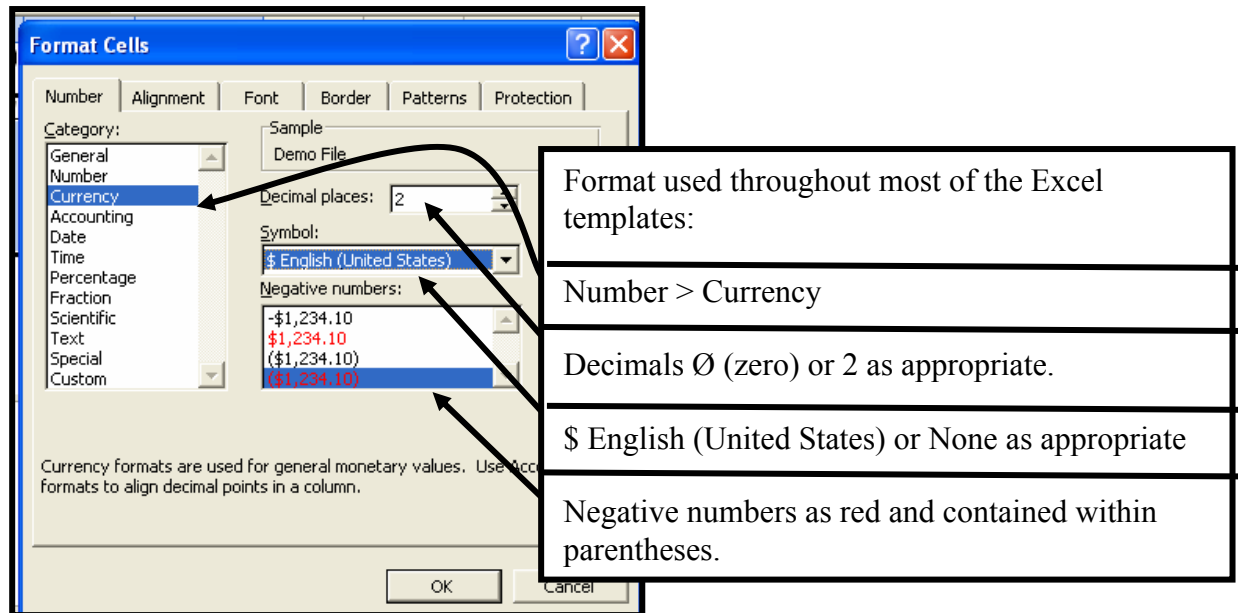
To present date and time via a formula function use the “=NOW()” function. This function correctly inserts the current date and time. Like the “Today” function, the “Now” function can be formatted to obtain the precise desired format for the date and time, date only, or time only if desired through “Custom” cell formatting.

**Note:** These values may be updated by Excel upon opening the file later so they should be converted to “hard values” (non-formula or function) through direct entry type in or through the Edit > Paste Special function addressed elsewhere in this book.

### **Formatting Cells**

Excel has several ways to format cells and the data within a cell. To format a single cell, click into the cell to make it the active cell. If the format is intended for a single range of cells, click into the upper left, upper right, bottom left, or bottom right cell and sweep the range with the left mouse button down, highlighting and selecting all of the cells in the range. Formatting can be applied to more than one cell or one range by holding the Ctrl (Control) key down while selecting the sequential cells or ranges. Formatting can also be applied to a single column by clicking on the column identifier, a single row by clicking on the row number, or on multiple columns or rows by clicking on the column or row and then sweeping to right, left, up, or down to highlight all the columns or rows or holding the Ctrl (Control) key down while selecting non adjacent columns.

Once the cell or cells are selected, right click into the highlighted cell or cells and Excel will present you with the “Format Cells” pop-up dialog box with the formatting options available at the time. That dialog box appears below:



From this dialog box you can select any of the many formatting features available at the moment. If a feature is grayed out or faded, that feature is not available at the moment. For the Excel templates, the formatting is generally Currency with either 0 (zero) or 2 (two) decimal places as appropriate. Occasionally 4 or 5 significant digits is set as required by the exercise or problem.

In selecting numerical formatting Excel positions the right hand number appropriate for the formatting selection as to how negative values are presented. Provided below is a display of numerous Excel formats in positive and negative numbers. A close examination of this screen print will reveal that not all of the numbers are aligned in the same vertical plane at the right side of the column. This occurs when Excel is formatted to display negative numbers with a preceding “-” negative sign in some cells while other cells display negative numbers contained within parenthesis “( )”, Excel will position the numbers farther to the right if a preceding negative sign is used since the space is not needed to the right in the event of the closing parentheses. The solution for a ragged display of numbers that do not right align correctly is to check that the formatting of the numbers is all the same by selecting and highlighting the cells and right-clicking them followed by selecting the desired format even if it appears correct. Excel will occasionally only show the formatting of the upper left hand cell of a range or multiple selection.

1	Input value:	Format:
2	\$ 123,456.79	Dollar sign on tool bar
3	\$(123,456.79)	Dollar sign on tool bar
4	12345679%	Percentage sign on tool bar
5	-12345679%	Percentage sign on tool bar
6	123,456.79	Comma on tool bar
7	(123,456.79)	Comma on tool bar
8	123456.789	Format dialog box - Number - General
9	-123456.789	Format dialog box - Number - General
10	123,456.79	Format dialog box - Number - Number - 1000 separator, red () for negative, no sign, 2 decimal places
11	(123,456.79)	Format dialog box - Number - Number - 1000 separator, red () for negative, no sign, 2 decimal places
12	\$123,456.79	Format dialog box - Number - Currency - Number - red () for negative, \$ sign, 2 decimal places
13	(\$123,456.79)	Format dialog box - Number - Currency - Number - red () for negative, \$ sign, 2 decimal places

The “Format Cell” dialog box also contains the “Alignment” tab. From this tab, you can align the contents of the cell in numerous horizontal and vertical formats as well as change its orientation and stack it. Through the

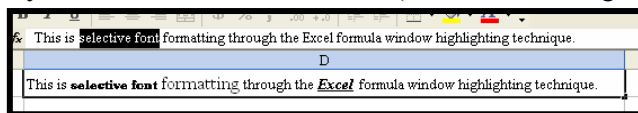
H O T E L	This is done with the Alt-Shift Function	Orientation at 90°
-----------------------	--	-----------------------

“Orientation” formatting function you can rotate your data through various angles. The insert, shown here, contains an orientation sample. Another mode shown here is referred to as “Hotel signage”, referring to the letters H-O-T-E-L will be printed vertically on the sign in front of the establishment. This is also shown in the insert. Text wrap will try to keep the preset column width while creating a second, third, and fourth row presentation within the cell of long data.

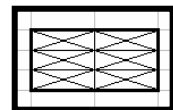
**Tip:** You can force line breaks in a cell, as done here, by the keystrokes “Alt-Enter” within a cell rather than of simply Enter or a space. In the insert, “Alt-Enter” produces the same presentation as text wrap except that you control the break points of “Alt-Enter” whereas text wrap makes its own decisions.

The “Merge Cells” command is also on the “Alignment” tab. This function will create one cell that occupies two or more rows or two or more columns or, as one group, multiple rows and columns. This function is used in many of the templates to present instructions and text data in one, large, cell. For example, the “Name” area is one cell while occupying the range D2 through F2. To utilize the “Merge cells” function, click into the cell that you want to be the upper left most location of the merged cell. Then, with the left mouse button held down, sweep right, down, or down and right highlighting and selecting the cells you want to be replaced by the new, larger, merged cell. When the area is highlighted, right click the highlighted area, select “Format Cells”, select the “Alignment” tab, and select “Merge Cells”. The highlighted cells now become one single cell when the “OK” is clicked. Invoking the merge cell function will result the loss of all data but the data in the upper left most cell of the selection. Excel will usually advise you that this is going to happen but it is poor data management to rely on Excel’s protective features for this. If this function is invoked, it can be revoked by selecting the affected cell and then removing the check mark from the “Merge Cell” option. Selecting “Wrap Text” and / or “Shrink To Fit” are text functions for the merged cells. The “Wrap Text”, discussed elsewhere in this book, it will allow multiple lines of text for a single line of text entry. The “Shrink To Fit” selection will automatically change the size or “points” of font to present all of the text into the cell.

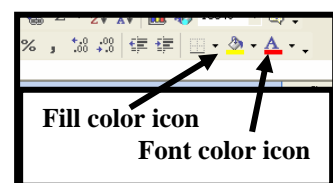
The functions of “Font” are as expected in any Windows standard application. You can change style, size, and color through this tab. It is on this tab that you will find “Superscript” and “Subscript” functions as well as “strike through”. You can also underline the text contained within a cell from this tab including single and double lines for accounting. However, if underlining is selected, it is only effective on cells with content in them, including spaces, and is only applicable to the cell. That is, if your entry covers two, three, or four columns, only the column or columns selected will be underlined and then, only if data actually appears within them. You can also highlight specific text within the Excel formula window and underline or format only that text such as shown here: (Addressed in length later.)



The “Borders” tab allows you to place borders and intermediary lines to the highlighted cell or cells. You can put a thick line on the outer edges by selecting the heavier line first and then clicking the “Outline” icon on the tab. You can then select a thinner line and place lines within the range. Excel will also allow you to place vertical, horizontal, and diagonal lines through a range. The functions available through this tab are directly associated with the cell or range selected at the moment. Excel will not allow you to place vertical or horizontal intermediary lines within a single cell through this method, you can draw a line through the cell as explained in the “Drawing” section of the book.



Under the “Patterns” tab of the “Format Cells” dialog box you will find the colors to fill a cell and the available patterns for texture presentation of those colors. These functions were used on the templates to define the work area, outlined in gray, and the student focus areas, filled in light yellow. To remove a color, simply select the cell or range of cells, right click the

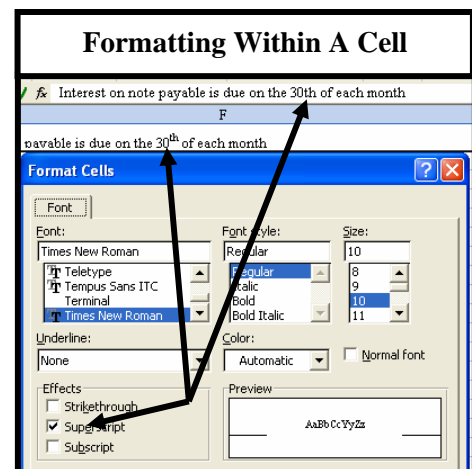


selected cell or range, select format cells, select “Pattern” and then select “No color”. This will remove both color and texture or pattern. Limited colors can be added to a cell or range of cells through the “Fill” button or icon on the task bar. This is the “Paint bucket” as shown here. All colors can be removed through this button. Fonts can be colored, to limited number of colors, with the “Font color” button or icon. Next to both the “Fill” and “Font color” icons is a dropdown arrow to allow color selection. If the bar at the bottom of the icon is the desired color, simply clicking the icon will place that color in the active cell or cells.

The last tab is the “Protection” tab. This tab allows you to invoke a minor level of protection on the worksheet or workbook. If you did not want another party to have the privilege of modifying your worksheet you can select the entire sheet by using the keystrokes Ctrl-A or by clicking on the cell above the row 1 number and to the left of the column A letter, then right click the worksheet and select “Format Cells”. After selecting the “Protection” tab, select the “Locked” option. Ensure that the appearing checkmark is clear and distinct. A faded checkmark indicates that the selected area contains more than one level of protection – some protected, some not protected. Also on this tab is the “Hidden” option. If “Hidden” is selected and activated any functions or formulas will be hidden from the viewer – that is, even if the cell contains a formula, the viewer will not see it in the formula window. Neither of these options are active until empowered by following the path Tools > Protection. From this point you can select “Protect Workbook” or “Protect Worksheet” as well as a couple of other options. When “Protect Worksheet” or “Protect Workbook” is selected you will be presented with a pop-up dialog box asking what privileges you want to grant the users and asking if a password will be utilized. You can leave the password blank if you desire and it will still be protected or hidden. If a password is provided and later forgotten, you may not be able to recover the workbook or worksheet. As a matter of technique, if distributing a password protected workbook or worksheet, you may want to preserve an unprotected copy in a secure location. None of these protection levels is sophisticated and they can be broken by an individual with intent, therefore, these levels of protection should not be relied upon to protect sensitive data.

## Formatting Within A Cell

You can also invoke many of the formatting capabilities for cells onto the specific elements contained within a cell. For example, you want to enter into an Excel cell that the interest on the note payable is due on the 30<sup>th</sup> of each month. When the text is entered as “Interest on note payable is due on the 30th of each month” the text is not automatically superscripted. For this presentation, select the cell containing the text, then, inside the formula window, highlight with the mouse the two characters “th” within the text, then right click the highlighted selection and select “Format Cells”, then select “Superscript” on the “Font” tab. Notice that not all of the tabs that appeared when “Format Cells” was selected while entire cells were selected are visible now that you have only a portion of the text selected. Since the additional capabilities are not available, they were not presented, even grayed out or faded. Many of the formatting features can still be invoke upon the text within a cell.



# CHAPTER 5

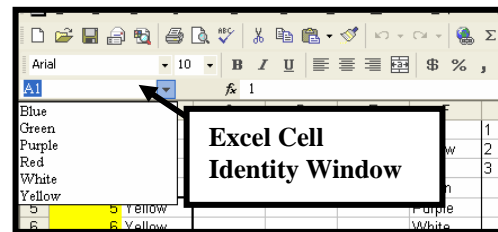
## CHAPTER OUTLINE

Name Ranges  
Embedded Formulas

Intermediate Formulas  
Paste Special

### **Name Ranges**

Excel will allow you to name a range as shown on the Named Ranges data file. Open the Named Ranges data file for this example. For Excel a named range is a single cell or multiple cells identified through the naming process with a unique name. Naming a cell or range of cells has some controls and restrictions such as no spaces and no use of what Excel classifies as a special character such as !, @, or \$ type symbols - usually the symbols above the numbers on the keyboard. To name a cell or range of adjacent cells, highlight the individual cell, or for a range click into the upper left, upper right, lower left, or lower right cell and sweep the range. If the range of cells are not adjacent cells, click into the first cell and highlight it or highlight the first range, then release the mouse button, press and hold the Ctrl (Control) key down and click into the second cell or highlight the second range, release the mouse button, continue to hold the Ctrl (Control) key down and continue to highlight the cells or ranges with the mouse releasing only the mouse button after each cell or range of cells. Then follow the path Insert > Name > Define and enter your chosen name in the pop-up dialog box. You can see, and verify, the defined cells in the “Refers to” window at the bottom of the box. You can also enter the name directly into Excel by clicking into the “Cell Identity” window on the formula bar and entering the name. By clicking into this box you will also see the other named ranges for the worksheet.



In the Named Ranges data file the ranges have been named for their fill colors. The ranges of Red, Yellow, Blue, White, and Green are all adjacent cells for their ranges. The ranges Purple and White are non-adjacent cells. Excel will include only the values identified by the range in the summation and math functions utilized by formulas calling for the range Purple or White. That is, when range Purple is cited in a formula, the values contained in the White cells are not taken into account even though they are amongst the Purple cells, they are not members of the Purple range. The cell B25 contains a formula summing all of the cells within the range of A18 through A25. This value is 76. However, only the cells A18, A20, A22, and A24 are considered and identified as participants within the range name Purple. The sum of Purple is only 36 as shown in cell B24. The formula to sum the range Purple is =SUM(Purple). In this situation, Excel is not case sensitive with SUM or Purple.

To the right of the cells are formulas showing different ways of summing the values of the cells. As you can see, you can address the range of Red several ways – “A1+A2+A3+A4”, “A1:A4”, or “Red”. You can see how Excel will add the values of Red and Yellow together and how it will add the rest of the ranges together as well as you look down columns C and D of the worksheet.

**Tip:** Within Named Ranges a cell can be a member of two or more ranges. This does not bring in the values of other cells in the separate ranges.



## Embedded Formulas

As addressed elsewhere in this book, the prefix of “=SUM(” starts Excel into the “I have to do something with formulas and functions” mode. As shown elsewhere in this book, Excel will perform functions and formulas within other functions and formulas. This embedding capability generates a power and flexibility within Excel that greatly aids the professional. The way to embed a formula or function is relatively simple. First and foremost, understand the functions and formulas you are utilizing. For example, if you are using the “Count If” function on an inventory sheet to find the total number of apples, your results will be incorrect. This is shown on the Embedded Formulas data file where the desire was to sum the number of apples, berries, and cakes but the “Count If” formula resulting in finding out how many times the text apples, berries, and cakes each occurred in the data field.

In the Embedded Formula data file the first task is establish a value for inventory by finding the value of the apples, the berries, and the cakes and then summing those subtotal values. In cells G23 through G25 and G27 Excel finds the number of each item. The values for these items as individual elements is contained in cells H23 through H25 and H27. In cells I25 through I25 and I27 the “Sum If” formula determines the sum total of each element and then Excel multiplies it by the element value contained in the H cell ranges. For the apples on row 23 the formula is:

```
=SUMIF($A$2:$A$250,F23,$B$2:$B$250)*H23
```

This embedded formula is the “Sum If” formula and a multiplication function by adding the “\*H23” at the end of the previously discussed “Sum If” formula. By using the “Look To” capability you can change the element value of the inventory items and see the results immediately.

Suppose that we wanted to be alerted if the value of any inventory category exceeded \$20,000. This can be accomplished through conditional formatting – covered elsewhere, so utilize “Concatenate”, a function discussed shortly, and “IF” statements. The formula in I23, broken down into three lines due to its length, reads like this:

```
=IF((SUMIF($A$2:$A$250,F33,$B$2:$B$250)*H33) > $I$31,  
CONCATENATE("$",FIXED(SUMIF($A$2:$A$250,F33,$B$2:$B$250)*H33,4,0),  
" Exceeds target value"),SUMIF ($A$2:$A$250,F33,$B$2:$B$250) *H33)
```

To understand this function appreciate that Excel looks at the deepest pair of parentheses and then starts working its way outward. In this case those parenthesis are contained within the “Sum If” function. So in line 1 of the formula Excel sums the number of directed inventory items, those identified in cell F33 – Apples, and multiplies the summed number by the value in cell H33 - \$0.12 per element item as supplied on the data disk. Then Excel is instructed to compare this total value to the value in cell I31 and determine if the summed value is greater than the value in cell I31. If the summed value is greater than the value in cell I31, \$20,000, as supplied on the data disk, Excel moves to the set of parenthesis inside the formula – those of the “If” statement. Since the statement is false (9,674 apples at \$0.12 each total \$1,160.8800) Excel executes the function contained in the second part of the “If” statement. This is actually a repeat of the “Sum If” formula summing the number of referenced inventory items and multiplying that sum by the element cost contained in cell H33.

However, in cell I35 the statement is true. The 15,771 cakes at \$1.8700 each total to \$29,491.7700 which exceeds the reference value in cell I31. Since this “If” statement is true, Excel executes the first half of the “If” statement – the concatenate function. This function is set to sum the total number of referenced inventory items – cakes, and multiply that sum by the cost in cell H35. Then Excel is told to format this value to 4 decimal places and with commas through the “Fixed” function. Concatenate adds a dollar sign as text in front of the total value for a presentation of “\$29,491.7700”. The concatenate function adds spaces and a text string saying that this value exceeds the limit. While not real useful in life, as will be shown in the Intermediate Formulas section to follow, this string of formulas and functions demonstrates the power Excel can provide if the user has imagination and knowledge.

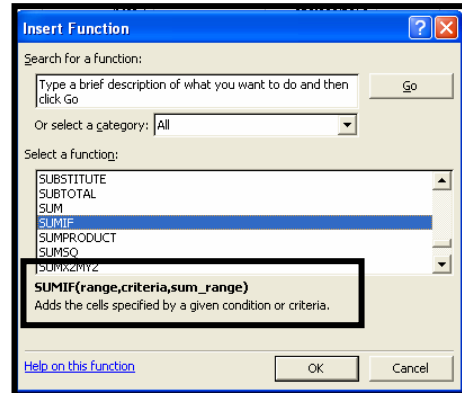
Notice that the only equal sign in the formula is the one at the beginning of the long formula string. An equal sign buried within the formula such as in front the “Sum If” or “Concatenate” formulas and

functions will result in an error message from Excel. You can only nest 7 sets of parenthesis within Excel. However, as shown in the section on Intermediate Formulas, this is only a restriction within a cell, not within Excel per say and can be easily compensated for.

The actual solution to this problem should have been conditional formatting of the cell or an “If” statement as shown in cells F40 through J45 where both “If” statements and Conditional Formatting are used on the values resulting in easier to write and troubleshoot the formulas.

## Intermediate Formulas

Excel has many built in formulas and functions which can be found through the  $F_x$  icon on the tool or task bar. Shown here is the dialog box that is presented when you click on the  $F_x$  icon and then search all functions or the Math and Trig functions. This dialog box provides an index of most of the structured Excel formulas and functions. Two very nice features of this dialog box are (1) the ability to select “All” as a category and scroll through every function and formula, and (2) the brief summary of actions and capabilities of the formula or function in the lower third of the dialog box, shown inside the rectangle on the screen print. In this screen print the “Sum If” function is selected. The dialog box tells you that it adds the cells specified by a given condition or criteria. Exactly what we were seeking in the “Sum If” tasking for the valuation of inventory earlier.



This dialog box can be narrowed down in its search through the selection made in the “Or Select A Category” window in the upper third of the dialog box. The categories include financial, math & trig, statistics, lookup and reference, text, and logical. Selecting one of these categories will narrow your search but may preclude you from seeing a viable option contained under another category.

Formulas and functions in Excel normally start with the equal sign, “=”, which keys Excel into expecting to accomplish something through a formula or function. From this point, text, data, and reference information is provided. The simple Excel formula of =B2, a “Look to” formula or function, placed in cell C1 would simply provide you with the contents of cell B2 being presented again in cell C1 as shown on the Intermediate Formulas data file. This formula can be used through many of the exercise and problem templates as the dates and values as well as some account titles are available in a “clean target” or source presentation. Excel will also do “Look to” on text values as shown in cell D2.

When text is incorporated as part of a formula or function within Excel it must be enclosed within double quotation marks or Excel will product an error message. In the “If” statement, a logic function or formula, shown in cell D12 in the Intermediate Formulas data file, you will see the word Apple or Apples. The formula or function, an “If” statement, in cell E12 is looking at cell D12 and responding based on the value in D12. If the value is singular – “apple”, Excel hopes it's a Washington State Apple. If the text is “apples” – plural, Excel hopes they are all Washington State Apples. However, if the text string is neither “Apple” or “Apples”, Excel tells you that it is not apples. Excel cannot really read, it is comparing text strings for validity. The formula says if you find the text string of “Apple” respond with the first of the “true” statements, if the text string is not equal to “Apple” Excel executes it false statement which is another “If” statement to see if the text string is equal to “Apples”. If Excel finds a matching text string, Excel responds with the second true statement in the formula, the plural response for “Apples”. If Excel did not find the text string “Apples” on the “second look”, it responds with the false response which declares they are not apples.

As addressed elsewhere in this book, there is a nesting limit of 7 levels within Excel. Can Excel determine what letter of the alphabet you entered and respond based on your input if there are 26 letters to

choose from? Certainly. Enter a letter (A to Z in upper or lower case) in cell D21 and watch the response. Excel will determine the letter and respond for that letter. To overcome the 7 layer restriction on nesting, after 6 levels, the formula looks to the next line – hidden by making the text white – for an answer. All of the lines, 4 in total, look to cell D21 and evaluate the value. If the value exceeds the limits of the first line on 21, the formula in the first line looks to line 22. If the value in cell D21 matches one of the values in line 22's range, line 22's formula responds, if line 22's range is exceeded, line 22 looks to line 23, and then line 23 looks to line 24. This process can continue until you run out of cells in the worksheet. If line 24 has the valid answer, it passes it to line 23 which passes it to line 22 which passes it to line 21 which displays the valid response as the "False" response to its own "If" statement. The "False for line 21 is look at line 22. After filling a worksheet with chained references you can reference the next worksheet in the workbook. After the number of worksheets is exceeded, you have Excel reference a second, then third, then fourth workbook and so on. So, while there may be a nesting limit within a cell of Excel, there is no true nesting limit if you "Look To" the next cell, worksheet, or workbook.

Often a formula can be set up in a "template" format for frequent use without new formula structures being required. Suppose that you did a lot of work with the Present Value formula. Set the formula up as shown in cells D31 to G35. In cell G32 the present value formula resides and looks to the cells D31 through D35 for information. Anytime that information is changed the formula recalculates the present value. (Almost) Instant answers to a formula with little typing once the formula is set up.

Occasionally Excel will have problems with formulas that should yield specific results. The frequently effective solution is to insure that the formatting of the cells is not precluding the formula or function action. For example, click into cell H38 of the Intermediate formulas data file. Once the cell is active, click on the Omega symbol ( $\Sigma$ ) for quick sum and Excel looks over to column A and generates a formula of =SUM(A38:G38) while you would have expected Excel to generate a value of 28 (1+2+3+4+5+6+7) the response is only 17. A check of the formula in cell H38 shows a correct formula - =SUM(A38:G38), the sum is obviously wrong. Click into cell H39 and click the Omega symbol ( $\Sigma$ ) for quick sum and Excel looks over to column A and generates a formula of =SUM(A39:G39). And the response is 28, the correct sum of 1+2+3+4+5+6+7. Now click into cell A38. Once the cell is active, left mouse button down and begin to sweep right on row 38, when cells A38 and B38 are highlighted, the sum at the bottom, right side of Excel shows "3", the correct answer. As you sweep right along row 38 the sum increases to 6, and then 10. When you sweep into the cell containing the value of 5, there is no increase, there is no increase when you sweep into the cell with the value of 6, but sweeping into the cell with the value of 7 results in a sum of 17 appearing at the bottom of the screen.

Time to troubleshoot and the focus has been identified. Click into cell D38. Then right click the cell and read the formatting – it is "General". Click into cell E38 and check its formatting – it is "Text". In the "Format Cells" dialog box Excel tells you that even though a numerical value may appear in this cell, it is text and will not function as a number or value. The same for cell F38. Reformat the cells as "General" or a numerically acceptable format – number, currency, or accounting, and then reenter your data and the sum is correct – as shown in line 39. Excel had the numbers 5 and 6 entered after the cells were formatted to text so even reformatting the cells to "General" does not change the data – text images of 5 and 6, to numerical data until the cells are reformatted and the data is reentered.

Scrolling through the "All" formulas and functions category of Excel will reveal many useful formulas and functions applicable to the exercises and problems of the textbook. However, Excel is a tool and the results of every Excel formula and function needs to be evaluated for reasonableness. When working on extensive and intricate data proof the concept with basic data and simple values. For example, with the "DDB" function to handle double-declining depreciation of an asset, verify it with a \$10,000 asset, \$0.00 salvage value, 5-year life at 200%. This should return a value of 40% of \$10,000 (100% / 5 year life X 200%) or \$4,000 for the first period. If another value is returned, something is wrong with the formula selection, the data input, or formatting. In this formula, Excel is not expecting 200 for 200%, it is

expecting either “2” for twice straight-line or “200%”. Excel also is not expecting commas to be entered into the values.

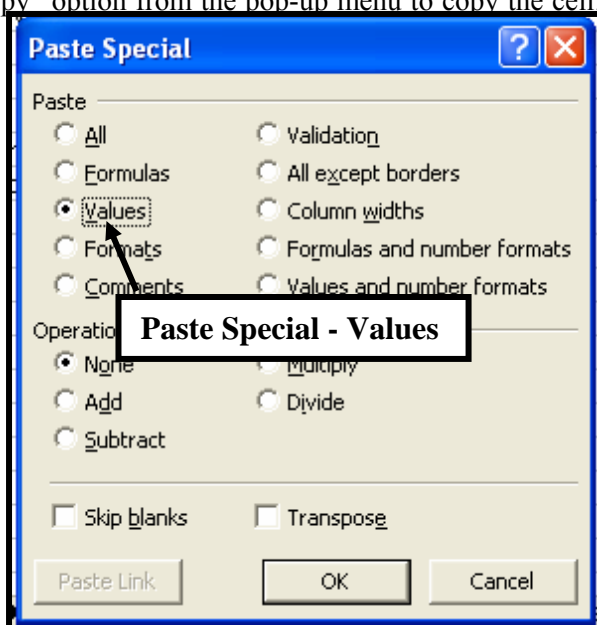
**Tip:** While working on formulas and functions, you can insert a single text character in front of the equal sign and the formula or function becomes a text string and will not process. This does not reformat the cell and preclude later mathematical operations. This is a handy “escape” while troubleshooting problems and situations that may arise during entry. Excel does not want you to leave the cell with a formula or function it cannot handle. Excel may present you with proposed resolutions and trouble screens. Just because Excel presented it, does not mean it is correct or acceptable. By inserting a character in front of the equal sign this can be stopped. As a matter of presentation, if the character is a single or double quote, Excel will not show that character in the display of the cell data. This makes the single or double quote presentation neat and clean. You can see many of these inserts through the data files.

## Paste Special

When you generate a formula within Excel it is dynamic or “live” and dependent upon its reference cells. If you change a value in a referred cell, the results of the formula will change according unless “Manual Calculations” has been invoked through the Tools > Options > Calculations dialog box. As shown in the “Concatenate” function and worksheet, changing a cell will change the text string produced by the function. There is a way to convert formulas into their results which stops this without retyping or reentering all of the data. Copy the target cell, in this case, click into cell B1 on the Paste Special data file, which is a copy of the “Concatenate” data file. This cell contains a live formula or function of Excel that creates the text string about foxes and dogs. In the formula window you will see the presentation of the formula. Use the keystrokes Ctrl-C, click on the copy icon (two overlaying sheets) on the task bar, follow the path Edit > Copy, or right click and select the “Copy” option from the pop-up menu to copy the cell. This copies the formula or function onto the Windows clipboard. Place your cursor back over the B2 cell and right click the cell to get a pop-up menu or follow the path Edit > Paste Special to get the same pop-up menu. From the pop-up menu, shown here, select the “Paste Values” option and click OK. At this point Excel will replace the formula or function with the results of the formula or function. The “Concatenate” function is gone, the resulting string is no longer dependent upon the parent cells. So changing cell A17, the word “dogs” to “house” will not change this string any farther. However, the text string in cell B1 is still dynamic or “live” and it will with the text change.

“Paste Special” is a handy function for workbooks and worksheets that are going to be distributed to individuals who like to “play” with your extensive formulas and functions. By selecting the entire sheet, copying, and pasting the data back through “Paste Special > Values” the data will be static and not dependent upon the source cells. This process also reduces the size of large Excel worksheets significantly making them easier to attach for transmission and distribution. This feature or function also helps when the values within the worksheet are built on values contained within other workbooks that the recipient may not have access to.

The “Concatenate” data file was copied as the “Paste Special” data file so you can practice “Paste Special” on its numerous dynamic or “live” formulas. Try “Paste Special” on an “intermediate” formula –



one that is called upon by another “Concatenate” function such as those formulas where part numbers are assembled and watch the results of the costing formulas when the parts grid is changed.

# CHAPTER 6

## CHAPTER OUTLINE

SumIf  
CountIf  
Filter

Sort  
Master Sort Column  
Concatenate

### **SumIf**

Excel has many excellent tools to assist in mathematical valuations. Using inventory as an example, if the inventory count sheets are entered into Excel worksheets the “Sum If” (“=SUMIF( )”) function can be utilized to find the individual items and sum the total number of those parts that appears within the worksheet. This is not counting the number of times the item or value appears within the Excel worksheet, that function is accomplished through the “Count if” function. The command string for this function is =SUMIF(Reference range, selection criteria, sum range). If the selection criteria is text rather than a number, it must be enclosed within quotation marks such as “Boxes-10”X10”X5””.

**Note:** Numbers such as “123-456-789” should be handled as text to assure the proper results.

For example, the “SumIf” formula that would locate the number “4” within the rage of B2:B100 and then sum the values within the range of C2:C100 would be =SUMIF(B2:B100,4,C2:C100). The “SumIf” function to locate the text string of 123-456-789 within the same range would be =SUMIF(B2:B100,“123-456-789”,C2:C100). In the “Sum If” data file on the data disk there is an example of the “SumIf” function counting apples, berries, and cakes. The caution with this function is that “Apple” and “Apples” are two different text strings so data entry discipline is required.

Within the “Sum If” data file is a sample of three “SumIf” formulas contained in cells G2, G3, and G4. These formulas look to column F to determine what they are each looking for – Apples, Berries, or Cakes. The range they are looking at is column A, rows 2 through 250. The values these formulas are summing are the corresponding values in column B, rows 2 through 250. Notice that there is one line identified as “Apple”. This entry, row 26, is filled and font colored for easy locating. If you sum the individual quantities and include this line in the grouping of “Apples”, you will find that your result and Excel’s results do not agree. To Excel, “Apples” and “Apple” are two distinctly different items. This is verified with other formulas on the page and subtotals for your own verification.

These formulas, as provided, all utilize “Look to” formula capabilities as shown in the text presentation of the formulas in column H. This capability reduces typing, increases speed, and improves accuracy. In rows 15 through 22 of the formulas columns the text values have been entered with the required “Apples” type formatting. Excel is not case sensitive as to “Apples” or “apples” with the “Sum If” formula.

**Hint:** When using “Sum If” for formula work where all of the items of a column will be placed and counted into one or more categories make sure that all values are counted with a technique similar to that used in cells G5 and G9. This reduces the probably of missed data.

### **CountIf**

The “Count If” function of Excel will count the number of occurrences of the specified value. In the “Count If” worksheet within the “Count If” data file the function is shown in operation. The formula is

“=COUNTIF(range for the count, reference value)”. The Count If range can be cells, single a column, multiple columns, a single row, or multiple rows. This is shown on the “Extended Count If” worksheet of the “Count If” workbook.

## Filter

Another excellent Excel tool is the “Filter” function. When a worksheet is selected or when specific columns are selected and the path Data > Filter > AutoFilter is followed filters will be imposed on the worksheet by Excel. A filter is a tool to screen and restrict the presentation of data. In the “Filters” worksheet of the Filter data file on the data disk “Filter” has been established. For this worksheet, columns A and B have had the “Filter” function imposed on them. Unless restricted, through “AutoFilter”, Excel will put a filter on every column, why this may be a bad idea is shown in the filter selections of column B where every individual quantity has its own selection criteria. While this does not hurt, even if not used or appropriate, only Column A is really relevant or usable.

When filters are imposed on a worksheet, Excel puts an additional button on the top of each column with a filter. This button has an arrow pointing down on it and is contained in the first row of the column. By clicking on this arrow, you activate a drop-down menu showing a complete listing of every text and numerical data entry in the column. In the Filter data file, click on the drop down arrow in column A and click on “Apples”. All of the items not meeting the criteria of “Apples” in column A are hidden and every row meeting the criteria is moved to the top of the worksheet. This compresses the data and hides the non-relevant data. By clicking on the drop-down arrow again and selecting “All”, all of the data is presented in the order that as held before the filtering action was invoked. Utilize the filter arrow for column B and see the number of options available due to the large number of unique values contained in the column. The filter database is automatically created by Excel. As noted earlier, this may be unnecessary.

Filters can be placed on every column in the worksheet and multiple criteria filtering is possible. In a worksheet containing parts locations by state, county, city, warehouse, row and rack, you could filter column A to only your part number, then filter column B to the State you wanted, column C to the county, column D to the city, column E to the warehouse. That could easily and quickly take thousands of rows down to one or two. With only one or several columns containing active filters Excel will maintain row integrity of data. That is, Excel moves the entire row when a filtering action is imposed on one column of the worksheet. The “Multiple Filters” worksheet on the “Filter” data file is an example of this capability.

Filters are removed in the same manner they are invoked. Follow the path Data > Filter > AutoFilter and they will all be removed. This is called a “Toggled” function – selecting it while it is active turns it off, selecting it while it is off turns it on.

## Sort

Excel will also allow multiple layer sorts. In a “Sort” function no data is hidden and the order of presentation has several options. In the Sort data file, Sort, there is a Sort worksheet to show this function. With Sort it is necessary select the worksheet, the columns, the rows, or the cells that you would like sorted. A caution that Excel will usually provide for you is that if selecting less than entire rows, Excel will sort only the selected cells. This may destroy the integrity of the data if completed. The “Undo” arrows may recover your data if a “Save” operation has not been initiated.

The most convenient way to utilize “Sort” is with titles in row 1 and row 1 frozen through Window > Freeze Pane while row two is highlighted. This will cause Excel to freeze row 1 and help row 1 to be identified as labels. The safest way to utilize the sort function is by selecting all cells within the worksheet by clicking on the “Select All” button above the row 1 number and to the left of the column A letter. After

the worksheet is selected follow the path Data > Sort and a pop-up menu will appear. Excel will usually assume that the first row of a frozen pane display is titles so titles should appear as the selection options. If your presentation shows column letter identification, simply select the “My List Has - Header Rows” option on the lower left corner of the dialog box. From this menu select Sort by > Part Nbr (Number) through the drop-down selection pane, Then by > State through the second, or middle, drop-down pane, Then by > County through the third, or lowest, drop-down pane. You can select whether you want them in ascending or descending order by clicking on the buttons to the right of each sort level as you desire. Clicking on “OK” will result in a sorted worksheet by your selected criteria. Worksheets can be sorted time and time again in different manners without restrictions. This will change the order of the rows, which, if important may not be recoverable unless a technique such as “Master Sort Column”, discussed elsewhere, is used.

If the worksheet is not saved upon exiting, it will be in the same configuration and data arrangement as the last save operation point.

## Master Sort Column

The “Master Sort Column” is a technique rather than an Excel function or formula. If you are going to sort worksheets you may be required to return them to their original order for a function such as auditing. For example, you have entered 41 inventory items into an Excel titled Master Sort Column (this is done for you on the Master Sort Column data file) worksheet for data manipulation. In the process of working with the data you discover what appears to be data entry errors that you want to verify. Once sort has been invoked on a worksheet it is not easy to restore the input or original order. So try putting a “Master Sort Column” on the worksheet and possibly additional sort columns as required for other reports, sort preferences, or users. To do this, insert a column at column A by clicking on the Column A identifier. Then right click on the highlighted column and select “Insert” from the options. This will insert a new column and “push” the highlighted column one column to the right. You can also insert a column, once a column is highlighted, through the path Insert > Columns. Excel will insert a new column and push the other columns to the right. The only time Excel will not do this is if every column to the limit of the worksheet has been utilized. Now title that new column “Master Sort” (or anything else you desire) and insert indexed numbers starting in the first data row. You can utilize the row number, such as “2”, as your first number to keep a match between worksheet row numbers to master sort numbers as shown in the Master Sort Column data file. Drag or fill this column through the data entry range. Now, whenever you need it back into data entry order simply select the worksheet and sort by the Master Sort column, column A, in ascending order, and it is back in data entry order.

Suppose that the Director of Sales wants the inventory file in Part Nbr (Number) order frequently. Insert a new Column B pushing the existing column B one to the right, and label the new column “Sales Sort”, sort the worksheet by Part Nbr (Number). Now, while in sorted presentation, put sequential numbers into column B as you did in column A with the master sort. Now any time the Director of Sales wants his presentation, select the worksheet and sort by column B in ascending order.

***Hint:*** Remember that as the data within the worksheet changes, the sort may need to be run and the sort index may need to be refreshed. Any party requesting special presentation of the data can have their own sort row and these columns need not be printed by excluding them from the print area. This exclusion capability is discussed in the “Print Area” elsewhere in this book.



## Concatenate

“Concatenate” is a powerful “text” function of Excel. “Concatenate” is the function for joining two or more strings of “data” into a single cell. On the “Concatenate” data file you will find a string of text entered into the individual cells of column A. In cell B1 the “Concatenate” function is written as:

```
=CONCATENATE(A1," ",A5," ",A6," ",A7," ",A8," ",A9," ",A10," ",A11," ",A15," ",A16," ",A17,":")
```

The result reads:

The quick brown foxes were chased by the slow black dogs.

This function is taking the contents of cell A1, placing a space as shown by the “ ” presentation, then showing the contents of cell A2 and so on. However, the text string shows that the foxes, no number specified, were chased by the dogs, no number specified. Since “Concatenate” is classified as a “text” formula, this would appear to be its limitations. However, as earlier stated, Excel will frequently allow embedded formulas and “Concatenate” is not the exception to that rule.

In cell B17 several embedded formulas have been added to put numbers into the statement. The formula now reads:

```
=CONCATENATE(A1," ",SUM(A2+A4)," ",A5," ",A6," ",A7," ",A8," ",A9," ",
A10," ",A11," ",SUM(A12+A14)," ",A15," ",A16," ",A17,":")
```

This formula or function results in:

The 2 quick brown foxes were chased by the 4 slow black dogs.

Which includes the number of foxes and dogs as summed by the embedded formulas of “Sum”.

***Hint:*** Embedded functions and formulas do not get introduced with an “=”.

With this function you can create the mailing label string for invoicing as shown in cells A21 through E24. In this situation, since the data is intentionally entered horizontally, the “Concatenate” formula was written into cell E21 and dragged through rows 24.

Assume that you are making custom pens and pencils and using “Smart Part Numbers” – numbers that indicate through a consistency of presentation what they are or what they do. The code is:

First Part:

PN – Pen part                      PL – Pencil part

Second Part

G – Gold                              S – Silver                      B – Black                      N – N/A – No color

Third Part:

UP – Upper portion              LP – Lower portion:

Fourth Part:

TB – Tube                              BK – Blank                      TP – Top plug or insert  
 CL – Clip                                MB – Middle band              NB – Tip                      PNR – Pen refill  
 OM – Operating mechanism              PLR – Pencil refill

Starting at row 27 of the “Concatenate” data file the part numbers are established by whether it is a pen or pencil part, by its plating, whether it is an upper or lower portion part, and then the part itself. When the part numbers are set into the matrix of cells H29 through K39, the “Concatenate” formulas in column L assembles the number into a string of numbers (hard to remember for inventory – use alphanumeric combinations in real life). The “Concatenate” formulas in column M reads the part number matrix and then assembles the “code” of two and three letter identifiers through “Vlookup” functions. Lastly, the “Concatenate” formulas in column O reads the part matrix and through “Vlookup” assembles the text description of the parts necessary for the pen or pencil. The dashes and spaces are put in as a

portion of the “Concatenate” formula. Through the use of relational and absolute references, the formulas can be dragged and moved without changing the values of the references. While this “little” inventory table may be quicker to build in pure text, how about a car manufacturer or aircraft builder’s inventory?

***Hint:*** Once the text string is built and looks good – good data management requires that they be inspected for validity – you can use the Edit > Copy then Edit > Paste Special > Values to eliminate the formulas and stop the transition any time something changes.

If text is entered directly through the “Concatenate” formula it must be included in double quotation marks – “ ” as the dashes and spaces were. If embedded formulas and functions are utilized such as the “Vlookup” function, do not precede it with an equal sign (=), Excel will present you with an error message. The comma is used to separate portions of the “Concatenate” formula. While “Concatenate” is limited to seven levels of parenthesis it will operate with “Look To” bringing the results of other formulas and cells into one string. That is, you can use “Concatenate” to assemble text strings generated by other “Concatenate” formulas as shown in cells H44 through H52 where “Concatenate” assembles the part number, the alpha number, the description, and the cost into one string of text. The “Fixed” function is utilized to insure that the presentation of the values remains constant – with commas and two decimal places.

# CHAPTER 7

## CHAPTER OUTLINE

Absolute References  
Copying A Formula

Cut Command  
Delete And Delete

### **Absolute Reference**

Excel has a function called “Absolute Reference”. This function will maintain cell reference by column, row, or both when the formula or function is copied or moved. To understand the function, you need to appreciate how Excel copies & pastes or moves things, which are two different operations. On the “Absolute Reference” data file there is a small range of number and some formulas to show how Excel handles “Absolute Reference”, “Copy and Paste”, and “Cut and Paste” or “Move”. In cell C1 the formula is totally relational. The Excel formula in cell C1 reads =A1+A2+A3, what Excel is really saying is look two columns to the left (formula in column C, first value in column A,) then, do not change rows, (both formula and first row reference is row 1), and add that value to the value two columns to the left and one row below the formula row, and add that sum to the value found in the cell two columns to the left, and two rows down. This is “Relational Referencing”. To prove this concept out, click into cell C1 to make it the active cell and then use the keystrokes “Ctrl-C”, right click the cell and select the copy option off the pop-up menu, or follow the path Edit > Copy to copy the formula (contents) of the cell. Now move your cursor over to cell F1 and click into cell F1, activating that cell. Now right click the cell and select “Paste” from the pop-up menu, follow the path Edit > Paste, or utilize the keystrokes Ctrl-V to paste the formula into cell F1. When you complete the paste operation, the value returned by the formula is #VALUE because you are telling Excel to mathematically add the three text strings contained in cells D1 through D3 together and that is obviously an error of procedure. This is because you moved the formula in cell C1 3 columns to the right and now Excel is looking at cells D1 through D3 – the same relationship that cells A1 through A3 held to cell C1. They are 2 columns to the left and on the row of the formula, one row below the formula, and two rows below the formula.

Click back into the cell C1 and copy the formula again. This time paste the formula into cell F5. This time the formula returns the value of 0 or zero since it is now looking at cells D5 through D7 and there is nothing contained within those cells. The relationship of cells D5 through D7 are the same to Cell F5 as the relationship of cells A1 through A3 are to cell C1 and cells D1 through D3 are to F1 – two columns to the left and on the formula row, one row below, and two rows down. These are “Relational References”.

To overcome relational reference factors Excel allows you to place a special character – the dollar sign (\$) in front of the column identifier, the row identifier, or both the column and row identifier changing “Relational Reference” to “Absolute Reference”. In the “Absolute Reference” data file click into cell C2, this formula is absolute reference to the column only and is relational to the row. The formula is =\$A1+\$A2+\$A3. Copy the formula and paste it into cell F2 and watch the results. This time the formula returns a valid answer of 6. Examine the formula in cell F2 and you will see that the column reference has remained at A and the rows have remained at 1 through 3 since your original formula was on row 2 and the pasted formula is on row 2. Click back into cell C2 and copy the formula. This time paste the formula into cell F6. This time the formula becomes “=\$A5+\$A6+\$A7”. It maintained is column reference because of the dollar signs but the rows shifted. In cell C2 the formula looks one row up, then on its row, then one row down. Now on row 6 it is looking one row up, to row 5, looking at its

row, row 6, and one row down to row 7 and summing the values – no value so no total from within those cells. The formula maintained absolute column and relational row references.

In cell C3 the formula is written with relational column references and absolute row references. This is done by writing the formula as  $=A\$1+A\$2+A\$3$ . Experiment with copying and pasting this formula around the worksheet. The row references will always be 1, 2, and 3 but the column references will change by your relationship between column C and where you paste it. Try pasting it into column A or B and watch the results. Since the reference was to two to the left of column C, when pasted into column A or B the relational column is to the left of column A, a place in cyber space, the formula does not have access to. When pasted into column C in the lower cells the response is valid since the rows are absolute references and the columns are relational.

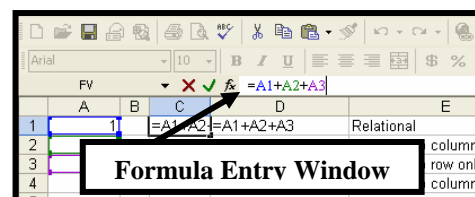
By writing the formula as  $=\$A\$1+\$A\$2+\$A\$3$  both the column and row are absolute reference and not relational. Copy this formula as shown in cell C4 to other locations on the worksheet and watch the results and resulting formula. Try pasting the formula into column A or B and watch the results. Since both the column and row references are absolute and not relational, the results are valid regardless of where pasted.

You can mix absolute and relational references as shown and you can absolute reference one value and relational reference the next. For example, there is a mini tax table on the “Absolute Reference” data file. The formula was placed into cell C10 was written to absolute reference the tax rate cell, cell C8, and then relational reference the purchase amount in column A starting at row 10. The formula was then dragged down the column. In the drag process, it maintained the absolute and relational references and produced the tax amount.

**Hint:** Suppose you write a long formula and now have to make it absolute reference. You can use “Find and Replace” – Ctrl-H - to do the work but be aware of what it may do against you. Using this capability, **ALWAYS SELECT A RANGE TO CONTROL IT** – if only one cell is selected “Find and Replace” can run the entire worksheet without control. Look at the formulas on the “Absolute Reference” data file in cells E10 through E19. If copied to a new location, the calculations will fail or be incorrect as they are totally relational. Select the range E10 through E19 on the “Absolute Reference” data file. Then use the keystrokes Ctrl-H or follow the path Edit > Find and Replace to bring up the “Find and Replace” dialog box. In the “Find What” window enter the letter “C” without quotation marks. In the “Replace With” window enter “\$C\$” without the quotation marks. Then select or click on “Find Next” (for the most protection possible) and Excel will highlight the formula it is about to edit. You can see this in the formula entry window. Click “Replace” and Excel advance automatically after the replacement option. Continue to review and replace the “C’s with “\$C\$’s and Excel will complete its operation on the range or “fault” out and give you an advisory when 10 replacements have been accomplished. If you had selected “Replace All”, Excel would have accomplished all 10 replacements on the selected area without you having the ability to bypass or decline a replacement. Remember to select a range with this function or every letter “C” (in this case) will be subject to replacement with “\$C\$”. Excel will generally not “damage” a formula with “Find and Replace” but to rely on Excel for data management and protection is bad technique. Now you can “Copy and Paste” the formula and it will be absolute referenced.

## Copying A Formula

Excel has several ways of copying formulas and functions. Most of them are considered “relational” in their operation. This effect is explained and shown in detail in the “Absolute Reference” section. The quickest and easiest way to copy a formula within Excel is to click into the cell containing the formula and use any of the numerous ways such as Ctrl-C to copy the cell. Then move into the target cell and paste the formula there via any of the numerous ways



such as Ctrl-V to paste the formula there via any of the numerous ways

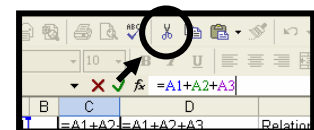
such as Ctrl-V to paste the value into the cell. However, this process is relational as explained in the “Absolute References” section. To **COPY** (not cut) the formula and not have it read relational to its target cell requires a little bit of technique unless the formula is absolute referenced. Open the “Copying A Formula” data file which is a copy of the “Absolute Reference” data file. Click into cell C1 which contains a formula summing cells A1 through A3 to make C1 the active cell and have its formula displayed in the formula entry window. In the formula entry window at the top of the screen, click into the formula entry window to the right of any data or text displayed and then sweep **from right to left** with the left mouse button down, highlighting the entire formula entry window. When the entire formula in the formula window is highlighted, use any of the copy commands of Excel such as Ctrl-C to copy the data. Move to the target cell, C5, click into it to make it the active cell. Notice that Excel has placed the formula “=C5” into the formula window. This is not what you want and Excel is trying to maintain a reference that is inappropriate for your use. To “break” this reference, press and release the Esc (Escape) key several times to “release” the cell relationship. Ensure that cell C5 is the active cell, you may have to click back into it. Now paste the formula into the cell with any of the paste commands of Excel such as Ctrl-V and press and release the “Enter” key or move out of the cell in any manner you desire. The formula is now in the target cell with its original references, not relationally moved. In this process, you copied the contents of the cell, not the cell, to a new location.

This technique will also allow you to copy a formula out of one cell and paste it into another cell as part of a new, larger formula. Remember that the “=” (Equal sign) is not used within embedded formulas. If you are building embedded formulas, as addressed earlier, you can proof the formula segment in one cell, use this concept to copy that segment and then paste it into the embedded formula cell. For example, contained within cell G1 is a formula summing cells F1 through F3. Copy the formula from cell C1 using the technique discussed above. Now click into cell G1. Remember to press the Esc (Escape) key to “release” the original cell reference and insure that cell G1 is the active cell. Click into the formula entry window to the right of the formula text contained in cell G1. Then use any of the “Paste” commands such as Ctrl-V to paste the formula from cell C1 into cell G1. When this is accomplished, click into the formula and change the “=” (equal) sign in the middle of the formula to a + (plus) sign to have the formula read “=F1+F2+F3+A1+A2+A3” vice “=F1+F2+F3=A1+A2+A3”. Remember that “=” (Equal signs) within formulas will cause an Excel error or fault message. Press and release the “Enter” key to complete the process. The formula now sums cells A1 through A3 and F1 through F3 with minimal typing.

Using this technique you can copy a portion of a formula and paste it back onto itself to build larger formulas and functions. This was done extensively on the “Concatenate” formula data file. It reduces keystrokes and it assures that you have an operational formula segment being placed into an operational formula segment reducing troubleshooting.

## Cut Command

The “Cut” command is accessible from the keystrokes Ctrl-X, the path Edit > Cut, right click on the cell or range of cells once they are highlighted and select it from the pop-up menu, or click on the scissors icon on the tool bar. To “Cut” a cell or a range of cells, highlight the cell or range of cells. If the cells are not adjacent to each other you will have to do more than one cut operation to get them as “Cut” will not accept nonadjacent cells. When you cut a cell or range of cells from an Excel worksheet they will not disappear immediately from the worksheet. The cut cells will remain encircled by a dancing daisy chain, sometimes referred to as “Marching ants”, until you paste them into their new location. When you use the “Cut” command to put the cells in the new location you may not receive any warning about over printing existing data. If you want to place the data in more than one location you will have to highlight it again, easy since it will remain highlighted after the “Paste” operation, then copy it and place it in the new



location. Cut is a one-time operation, you can paste several copies of a cell or range of cells from a “Copy” operation - but not from a “Cut” operation.

When you cut a cell containing a formula with the “Cut” command and paste it into a new location the formula retains its original references even if it was relational.

A feature associated with “Cut” is the “Insert” function. The function is found under the path Insert > Cut Cells or by right clicking on a cell after the “Cut” command has been utilized. If a column, row, range, or individual cell has been cut, this feature will insert it in relation to its shape and the target cell as instructed. If the positioning is not clear to Excel, a dialog box may appear that asks if you want the cut cells inserted by pushing the existing cells to the right or down. Formulas associated with the cut cells will be updated to the new location of their reference data. “Cut” will not remove a cell, range, column, or row from the worksheet, only the data on those cells and, this will not happen until the data is pasted somewhere else so do not use this command to remove or delete data from the worksheet. The “Delete” function will accomplish that. Also, if the “Cut” command is initiated and not completed with a “Paste” or “Insert” command, simply pressing the Esc (Escape) key a couple of times will cancel the operation.

## Delete and Delete

There are actually two “Deletes” within Excel. The first is the keyboard “Delete” key. This key will simply remove data from the worksheet without removing cells or their formatting. Any formula referencing the deleted cells may or may not continue to work correctly. This depends on how the formula works and where the value of the deleted cell was in the formula. If the deleted value is an element in a summing formula, that formula should continue to function properly since  $1+0$  is 1, a defined and acceptable process. If the formula added the values contained within three cells together and then divided that sum by the value in a fourth cell and one of the numerator values is deleted the formula should continue to work. If the denominator was deleted the formula will generate an error or fault since division by zero and null values is undefined.

The second “Delete” is from the path Edit > Delete or the pop-up menu found by right clicking a cell, range of cells, a row or range of rows, or a column or range of columns. When this option is used the selected cell or cells will actually be removed from the worksheet. This command will frequently result in a pop-up dialog box asking what movement you would like to occur as the cells are deleted – would you like the remaining cells to fill in the void you are creating by moving to the left or by moving up.

These deletes are two totally different functions – the “Delete” key clears data but does not clear formatting or remove cells. The “Delete” selection on the pop-up menu or the path Edit > Delete removes cells from the worksheet and causes other worksheet cells to be repositioned. All of these actions are reversible until the “Save” function is invoked. The “Save” function resets the “Undo” capability.

The data file “Delete And Delete” has been structured so that you can delete the contents of cells and delete various rows and columns to see what will happen to sum and division formulas. The “Sum” formula generated values will change as ranges deleted (cleared) or deleted (removed). If row 9 is left untouched the division operations in row 25 will continue. However, deleting row 9 will remove the sole element of the denominator of the division formula within row 25 and this will cause a fault or error in the formulas of row 25. The division operations on row 28 utilize a sum of the range of rows from 12 through 14 as a denominator factor. Deleting a numerator row should not affect the formula’s operation nor should deleting any one or two rows of 12 through 14 since a value is still in the denominator. However, deleting all of rows 12 through 14 will cause an error.

Look at the formulas before and after the operations and you will notice that Excel updates the formulas as you restructure the worksheet.

# CHAPTER 8

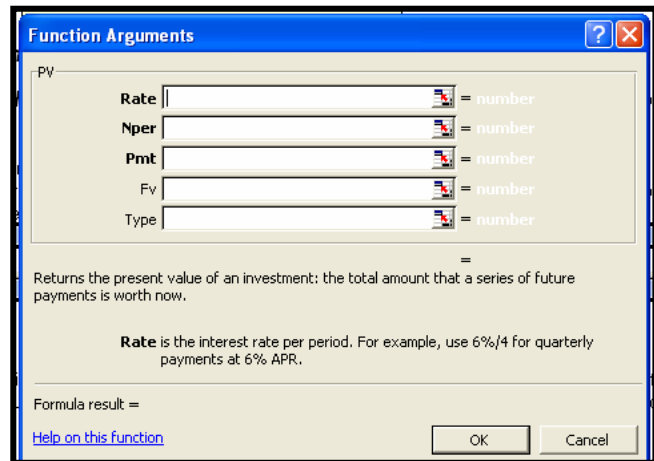
## CHAPTER OUTLINE

Present Value  
Future Value

Bond Table

### Present Value

Excel has a very powerful and easy to utilize formula for present value calculations under the title of “PV” in the financial category. This single formula will handle present value calculations of single sums or annuities as well as adjust them for payment at the beginning or the end of the period. The inserted screen print shows the “PV” (Present Value) dialog box. The “Present Value” worksheet in the “Time Value Of Money” data file on the data disk has numerous examples of this formula. The basic formula is =PV(Period interest, Number of periods, Amount of each payments, Future value, Payment at the beginning or the end of the period) with payment at the end of the period indicated by a 0 (zero) and payment at the beginning of the period indicated by a 1 (one). Leaving the “Type” (Payment type) window empty causes Excel to default to payment at the end of the period. By omitting the value for payments in the “PMT”, or by placing a 0 (zero)(best action), in the window, and providing the “PV” dialog box or formula a “FV” (Future value), the formula will produce the present value of a single sum. By placing the amount of an individual payment of an annuity in the “PMT” (Payment window), the formula will produce the present value of an annuity. For annuities due place a 1 (one) in the “Type” window to indicate payment at the beginning of the period, for an ordinary annuity, place a 0 (zero) in the “Type” window or leave it blank to indicate payments at the end of the period.



**Hints and Tips** on utilizing the dialog box – First, if you establish the data matrix as shown on the “Present Value” worksheet in cells A1 through D7 you can have formulas installed that will take the life in years and multiply it by the compounding factor for Nper. You can also divide the interest rate by the compounding factor to get the value for the period rate. Remember that, as with working with the tables in the textbook, the interest rate and the number of periods must be expressed in comparable values. If the document states that interest is 8% annually and it is compounded quarterly and that the life of the annuity is 10 years, the effective values are 2% interest (8% / 4 quarters per year) and 40 periods (10 years X 4 quarters per year). Excel can do this within an input matrix or within the formula by entering a value such as 8%/4 or 10\*4.

The formula will also produce the value of \$1, just like the tables in the textbook by placing the value of 1 (one) in the “PMT” (Payment) or “FV” (Future value) window as appropriate. This value will be carried out to more significant digits than the textbook’s tables even if formatted to show the same since Excel keeps the real value in its “mind” even with trimmed or formatted presentations.

Excel works with standard finance and math logic. If the “PMT” (Payments) values are positive indicating receiving cash or value, the “PV” (Present value) will be negative indicating cash or value flowing out. If the “PMT” (Payments) are negative indicating cash or value flow out, the “PV” (Present value) will be positive indicating cash or value flow in.

This worksheet has extensive “Concatenate” formulas to rephrase the statement for each formula. You can read the “Concatenate” function explained elsewhere in this book.

## Future Value

Excel has a formula similar to “PV” (Present Value) for “FV” (Future Value) located under the Financial formulas category. This formula is demonstrated on the “Future Value” worksheet of the “Time Value Of Money” data file. The formula is written as “=FV(Period Interest, Periods, Payments, Future value, Payment at the beginning or the end of the period)”. As with the “PV” (Present Value) formula, interest rates and periods must be stated in the same terms. The appearance of the dialog box is very similar. Like the “PV” (Present Value) formula this single formula with various inputs will provide the “FV” (Future Value) of a single sum or a series of payments - an annuity. It will accept payments made at the beginning or the end of the period. As with the “PV” (Present Value) formula, the “FV” (Future Value) formula will produce the value for the sum of \$1. This value will be kept within Excel to a greater number of significant digits than your textbook’s tables. This may cause a slight difference between Excel generated “PV” (Present Values) and “FV” (Future values) but the differences will not be material in nature – pennies on thousands of dollars.

## Bond Table

Excel will handle the task of a bond issuance, determination of present value of the issue and both effective and straight-line amortization of the premium or discount through numerous formulas including present value. The application of these formulas on the “Bonds – Premium” and “Bonds – Discount” worksheets of the “Bonds Table” data file closely matches the structure of the bond table in your textbook. As stated in the textbook, the essential pieces of information for a bond issuance are face interest rate, market interest rate, periodicity of bond interest payments, life of the bond, number of bonds issued and the face value of each bond as well as whether the amortization will be effective or straight-line amortization. All of the worksheets in the “Bond Table” data file contain this information in the upper portion and these values are used throughout the worksheets. By using the “PV” formula of Excel you can determine the present value of the principle and the present value of the interest payments. This is done on rows 11 and 12 of each worksheet. The sum of these two values is the present value of the issuance, shown on row 13. The difference between the present value of the issuance and the face value of the issuance, (or the difference between face or stated interest and market interest) determines whether the bond was issued at a premium or discount and the amount of that premium or discount. In the “Bonds – Premium” and “Bonds – Discount” worksheets formulas have been kept to an absolute minimum to closely correlate to the textbook presentation. Because of this, the worksheet will only present properly if the proper worksheet is utilized for the data. Contained on each worksheet, off to the right, is also straight-line amortization of the premium or discount on that issue. With the power of worksheets available on the desktop system effective interest amortization computation is almost as easy as straight-line amortization – except that because of the varying amount per period for effective interest method the journal entry cannot effectively be memorized.

If you look at the “Bond – Premium” worksheet, which is structured to accept semi-annual interest payments only to limit the use of formulas, you can see how the “PV” (Present value) formulas were utilized to determine the present value of the issue. In rows 17 through 19 the journal entry for the



issuance of the bond is shown. In cell B24 you can enter the period of interest and see the journal entry for that period. This is done through “Vlookup” formulas in cells E24 through F26. “Vlookup” formulas are discussed elsewhere in the text. Since formulas are minimized and the worksheet is structured to take up to 40 years or 80 periods, look at the results of the matrix when the term of the bond is 40 years. Then change the term to a value like 10 years and the worksheet matrix “gets messy” and you have problems finding the end of the data. Then change to premium interest rates to discount interest rates – face value below market value, and look at the matrix and the journal entries. This same structure and problem exists in the “Bonds – Discount” worksheet because of the rigidity of the formulas – two, three, or four values and only one process.

In the “Bond Table” worksheet, contained in the “Bond Table” workbook, there are extensive “If” statements that address all of these issues and add flexibility to the worksheet. With the structure and formulas of the “Bond Table” worksheet you can enter up to 40 years for the bond life and specific if it is semi-annual or annual interest rates. There are “If” statements that “read” the interest rates as provided and respond with a declaration of premium or discount. If you manage to “float” a bond with face at market this worksheet has no problem with that issue either. In rows 17 through 19, the proper journal entry will be structured through “Look to” formulas and “If” statements which contain text responses containing account titles and placements for all three possible issuance conditions. In rows 24 through 26 the period journal entries can be brought up by entering the period number in cell B24. In the matrix itself, the “If” statements in column B present the period increments appropriate to the life of the bond or the “Null Value”. This “If” statement process determines if the rest of that row will display making the matrix neat and clean for lines not relevant to the life of the bond issue. Inside the columns sensitive to premium and discount issues such as interest expense, “If” statements determine if the issue is a premium or discount and then provide the math for that specific issue.

Reviewing the “Bond – Premium” and “Bond – Discount” worksheets and their simplicity and presentation of data and then at the results of “Bond Table” and extensive “If” statements. Effort and knowledge can provide professional methods of presentation.

All of the worksheets contain straight-line amortization of premiums and discounts off to the right. These tables look to the effective interest rate data so you can do a comparison of the two methods. You can easily take this workbook on a 3.5” data disk as it is less than the disk’s standard capacity. It is also on the data disk as “Bond Table Static” in a “static state” where all the formulas have been removed through Copy and then Paste Special > Values. In this format the file is 89KB in size. While it presents all of the data as presented, the formulas are gone making the workbook smaller, easier to transmit, and transport.

**Clue:** The workbook is protected but there is no password.

# CHAPTER 9

## CHAPTER OUTLINE

Asset Acquisition Summary Sheet  
Depreciation  
Straight-Line Depreciation  
Declining-Balance Depreciation

Variable Declining Balance  
Sum-Of-Year's-Digits Depreciation  
Units Of Activity

## **Asset Acquisition Sheet**

The acquisition of a plant, property, equipment, intangible, or natural resource asset is seldom a simple one-page document event. Take for example the acquisition of a land plot, the construction of the new plant building, and the purchase of equipment for that plant. The land may have purchase price, commissions, back taxes, current taxes, survey costs, title searches, title insurance, and court and filing fees associated with it. The construction of the plant may have survey costs, architectural and design costs, environmental impact statement costs, construction fees, insurance during construction, interest and finance fees incurred during and after construction, legal fees, filing fees, and bonding fees. The purchase of a piece of major equipment for the new plant may have purchase price, commissions, site surveys, transportation, insurance during transportation and installation, installation costs, bonding of installation contractor, licensing and certification costs, costs for test materials, costs of training materials and labor while training line personnel and other costs. Some of these costs can be “capitalized” – put on the balance sheet and taken to the income statement over a period of time through depreciation. Others are period expenses and immediately taken to the income statement through an expense account. Payment of these fees and costs may be convoluted. One check paid to an escrow agent may address several issues on property acquisition – some to be capitalized, some to be expensed. A payment to a building fund trust agent may have the same issues – some to be capitalized, some to be expensed costs. The documentation of what check paid for what items and whether it is capitalized or expensed becomes important as these issues will most certainly be reviewed later and are taxation issues in this, and many following taxation periods.

The logical solution is to use a powerful tool, such as Excel, to retain the information and values as well as other information. On the “Asset Acquisition” data file there is a sample of what is possible for this purpose. It is not complex or complicated, it is simple and effective. It contains areas for identification of the machine, the supplier and point of contact information, capitalized and period costs detail, and where the documentation of those costs is retained. The recovery of documentation is simplified since the file states that the purchase paperwork is being kept in a fixed asset file in Accounting while the certification paperwork is being kept in the Floor Supervisor’s office for access and presentation during inspections.

While this could become a “standard form”, it can easily be changed to meet the requirements of the acquisition since, as an Excel document, it can be easily edited. To preclude editing the base copy, it could be saved as an Excel “Template”, discussed elsewhere, making it a “Read Only” file requiring renaming before saving after data is entered.

**Clue:** The titling of “Template” as utilized for the exercises and problems of the text has a meaning of all of the students has the same document. Within Excel, “Template” is a (normally) read only document that is kept in this status to maintain standardization and preclude the population of these forms.

This table, contained on the “Land” worksheet of the “Asset Acquisition” data file, utilizes “Sum If” capabilities to determine the totals of costs that can be capitalized and costs that are period expenses.

Asset:	Land plot at 3 <sup>rd</sup> and B Streets			Date:	January 2, 2000
Item:	Classification:	Amount:	Paid to:	Document location:	
Purchase price	Acquisition	\$75,000	Mrs. J. K. Conners	3 <sup>rd</sup> & B St file	
Commissions	Acquisition	\$3,750	Valley Realty	3 <sup>rd</sup> & B St file	
Back taxes	Acquisition	\$4,200	San Diego County	SD Cty Tax file	
Current taxes	Period	\$1,250	San Diego County	SD Cty Tax file	
Title search	Acquisition	\$750	County Title Svc	3 <sup>rd</sup> & B St file	
Title insurance	Acquisition	\$1,500	State Title Insurance	3 <sup>rd</sup> & B St file	
Survey costs	Acquisition	\$2,000	Inland Survey Svc	3 <sup>rd</sup> & B St file	
Filing fee	Acquisition	\$45	San Diego County	SD Cty Tax file	
Prepaid interest	Period	\$425	Lenders Banking Ltd	Lenders Banking	
Acquisition costs:		\$87,245			
Period costs:		\$1,675			
Total:		\$88,920			

Since Excel can “Link” or “Look To” other worksheets and workbooks, the values in these tables can be used to provide information to the depreciation schedules as appropriate. The key to success is knowing what you did and being able to prove it. Excel can become a database for information using techniques like this even though other programs are more effective; user familiarity, user comfort, and stability are keys with retrievability and recover.

## Depreciation

All depreciation files are in the “Depreciation” data file on the data disk. They all utilize a single reference source on the “Input” worksheet. Each methodology has its own worksheet for value calculations which looks to the “Input” worksheet. However, the “Units of Activity” worksheet has an input area where you can put monthly or annual activities in and get the proper results. This makes the discussion comparable since, if you input values on the “Input” worksheet, all the methods will portray values based on the same inputs in their own methodology.

There are some assumptions imposed on these sheets. There are no asset that have a life greater than 40 years and the units of activities will be fully depreciated through the number of activities within 40 years of acquisition.

## Straight-Line Depreciation

The straight-line depreciation concept is handled through the “SLN” formula of Excel. The formula is “=SLN(cost, salvage value, life)”. Since each period’s depreciation is the same value, this is a simple formula for Excel. This formula is shown in use on the Straight-Line worksheet of the “Depreciation” data file. In the “Depreciation” data file the “Straight-Line” worksheet receives its inputs from the “Input” worksheet. The example takes advantage of absolute references and embedded formulas to generate the period expense per month for the life of the asset, the accumulated depreciation to date, and the book value of the asset at the end of each period. The straight-line depreciation formula of Excel is found under the financial category and requires asset cost, asset salvage value, and life. Remember that Excel will not

accept commas or dollar signs within formulas. The formulas in the “Depreciation” data file utilize “Look To” and “Absolute References” extensively. The life must be in the same factor or terms that you wish to record the depreciation in. If you record depreciation monthly, state the life in months, if you record depreciation quarterly, state the life in quarters, if you record depreciation annually, state the life in years. For an asset with a cost of \$2,400, a salvage value of \$300, and a life of 120 months, the formula is =SLN(2400,300,120). Because straight-line depreciation is simple math the formula can be manually entered as =(2400-300)/120. Both will result in approximately \$17.50 per month.

The way that the Straight-Line worksheet works is the formulas in column A checks to see if depreciation periods are still available through the formula =IF(COUNT(\$A\$12:A12)>=\$B\$5,"",A12+1). If there are available periods, the formula increments the previous value by 1. If no periods are available the null value – “”, is put into the cell.

**Note:** The “Null” value is not a space or character. It is actually “Nothing”, This formula basically says, if there are no periods available, return “Nothing”. The null value is addressed in its own section of this book.

The formula in column B of the matrix, =IF(A12="", "", SLN(\$B\$2,\$B\$4,\$B\$5)), looks at column A and if it “sees” the null value (“”) is there. If it is, this formula places a null value in the cell. A null value just gives you a clean presentation for “no relevant data”. If the null value is not in column A, the SLN formula calculates period depreciation. In column D the formula =IF(A12="", "", SUM(\$B\$12:B12)) looks at column A for the null value and gives a clean cell response if there are no depreciation periods available. If there are periods available, this formula sums all of the period depreciation to date for accumulated depreciation. The formula in column E, =IF(A12="", "", \$B\$2-C12), looks at column A and gives a clean, clear cell if it finds the null value since there are no depreciation periods available. It then subtracts accumulated depreciation to date from depreciable acquisition cost for end of period book value. The other periodicity options for straight-line depreciation utilize the same concepts for presentation.

## Declining-Balance Depreciation

Excel handles declining balance depreciation through the “DDB” formula found in the financial category. The formula requires asset cost, asset salvage or residual value, life, period of life, and depreciation factor. Excel expects the number 2 or the percentage 200% to represent double-declining depreciation. Depreciation at 150% declining balance would be input as 1.5 or 150%. Excel will accept and work with any schedule entered in these formats.

The “Declining Balance” worksheet in the “Depreciation” data file shows the formula in action with the same basic values as utilized for the straight-line depreciation above. The “Declining Balance” worksheet looks to the “Input” worksheet for values and factors. The “DDB” or double declining balance formula requires the cost of the asset, the salvage value, the life, the period depreciation is asked for, and the factor. Even though the title of this formula is “DDB” indicating double declining balance, it will accept any logical factor you input. In cell B12 the formula reads “=IF(A12="", "", DDB(\$B\$2,\$B\$4,\$B\$5,A12,\$B\$7))”. The “If” statement checks for available depreciation as explained in the “Straight-Line Depreciation” section. It then looks to cells B2 through B7 for cost, salvage value, and the declining factor. The factor will default to 2, (200%) if left blank. Since declining balance depreciation is sensitive to the period for valuation, the “A12” reference provides the period reference.

**Clue:** Utilizing the DDB formula may require an adjustment at the end of the life of the asset to get the asset to fully depreciated amount of “0”. The table below shows double-declining depreciation by “Pencil and paper” without salvage value and no adjustment. If the adjustment is held until the last period of a 5-year life, the last year’s depreciation is actually \$12,960 while the fourth year’s depreciation expense is only \$8,640. This type of adjustment is not uncommon with accelerated depreciation schedules.

The “VDB”, or “Variable Declining Balance”, concept partially addresses this situation as it is capable of converting to straight-line depreciation when that method is more beneficial. The Variable Declining Balance method is addressed later.

Book value:	Period depreciation:	Book value:
\$100,000.00	\$40,000.00	\$60,000.00
\$60,000.00	\$24,000.00	\$36,000.00
\$36,000.00	\$14,400.00	\$21,600.00
\$21,600.00	\$8,640.00	\$12,960.00
\$12,960.00	\$5,184.00	\$7,776.00

Had the salvage or residual value of this asset been \$5,000, the last period’s depreciation expense would have been \$7,960, not the \$5,184 value computed by the mathematical operation.

### Variable Declining Balance

Excel has a formula that will handle the concept of accelerated depreciation at the outset of the schedule and then converting to straight-line when straight-line depreciation becomes beneficial. This is accomplished through the “VDB” formula or “Variable Declining Balance”. Like the “DDB” formula, “VDB” requires cost, salvage value, life, period reference, and factor. “VDB” also requires a specific statement if you want to switch to straight-line depreciation or retain accelerated depreciation throughout the schedule. By inserting a 1 (one) into the “No Switch” window, Excel will maintain accelerated depreciation through the life of the asset, by inserting a 0 (zero), Excel will switch to straight-line depreciation when it provides a greater benefit (more depreciation in the period) than continued accelerated depreciation. The “Variable Declining Balance” worksheet in the “Depreciation” data file shows this formula in action.

The way the formulas in column A works is explained in the “Straight-Line Depreciation” section – it determines if there are depreciation periods available. The depreciation formula in cell B12, reads “=IF(A12="", "", VDB(\$B\$2,\$B\$4,\$B\$5,0,A12,\$B\$7,0))”. After checking to see if depreciation periods are available through the “If” statement, the “VDB” formula looks for cost in cell B2, salvage or residual value in cell B4, the life in cell B5, the start period – 0 (zero) in this case since it is the first period, later lines will read the previous period from the line above, then the period its in from the row its on, the factor from cell B7, and the instruction to switch to straight-line when it is more beneficial. In the templates, this is not changeable – it is set to “Switch”. A word about the periods issue – since every period of declining balance depreciation has its own unique value the formula must know what depreciation period it is in. This formula is capable of determining the accumulated depreciation between any two points of the asset’s life. Assume you are preparing to sell an asset under “DDB” depreciation scheduling at the end of the 8<sup>th</sup> year of its 10 year life. You can use this formula written as =VDB(100000,5000,10,0,8,200%,1) to determine that accumulated depreciation to date would be \$83,222.78. In the data file you are trying to determine each period depreciation so you use 0 for the start of the first period and 1 as its end. For the second period you are using a reference to end of period 1 as the start of this period and a reference to period 2 as the end of this period.

**TIP:** It is very dangerous to use the “VDB” formula to determine accumulated depreciation for declaration of gain and loss on asset disposal since this mathematical calculation may not match the actual journalized values for depreciation.

By using the “VDB” formula and enabling it to switch to straight-line depreciation when more beneficial there is no need for the adjustment required at the end of the life cycle as shown in the “DDB” formula section. Additionally, this formula will not violate salvage value if the switch is enabled.

## Sum-Of-Year's-Digits Depreciation

Excel handles Sum-of-year's digits depreciation through the "SYD" formula. On the "Sum of Year's Digits" worksheet of the "Depreciation" data file you will see this formula in action. The sum-of-year's digits formula requires the cost, the salvage value, the life, and the period. With the "SYD" formula it is recommended that you remain with years as life and divide the annual amount of depreciation by 12 if you are posting depreciation monthly or divide annual depreciation by 4 if posting depreciation quarterly. Monthly depreciation is provided on the worksheet as annual depreciation divided by 12 as well as monthly depreciation based on monthly life for comparison.

Like the previous formulas, the "SYD" formula in the worksheet looks like `"=IF(A12="", "", SYD($B$2,$B$4,$B$5,A12))` where absolute references acquire the values from the top of the worksheet and relational references get period references. This allows the formula to be written in the second row of the matrix and dragged down the worksheet.

The "SYD" formula will not violate salvage value or require an adjustment at the end of the asset life as "DDB" and "unswitched" "VDB" may.

## Units Of Activity

Excel does not have a formula to handle units of activity depreciation. While the concept is rather simple, the sum of acquisition cost less salvage value divided by the expected units yields a per unit of activity depreciation value, that value is multiplied by the units of activity in the period to get period depreciation expense. Excel formulas to handle these issues get rather complicated if written to provide period depreciation, calculate book value, and calculate accumulated depreciation without violating the concepts of salvage or residual value. The "Units Of Activity" worksheet within the "Depreciation" data file has a working model of how this function can be written into Excel. This model makes extensive use of embedded formulas to ensure that depreciable value is not exceeded either in total or in a period entry. Examination of the formulas in row 12 will show that the initial formula in this line is different than the formula on row 13. This difference allows for a single period to fully depreciate the asset – it should have been a period expense if that were possible, then it checks and provides the appropriate depreciation for the period. In lines 13 and below, the formulas evaluate accumulated depreciation of prior periods to determine available depreciation then it determines period depreciation and precludes the violation of salvage value. When utilizing this worksheet you can put in period activity to determine period depreciation. The option of entering annual data and having Excel divide that value into 12 evenly valued units for monthly data entry is provided. A monthly input matrix is also provided. Then the worksheet subtracts accumulated depreciation from cost to get book value.

This worksheet does not utilize the concept of "If" statements referencing the life or period column since they are not relevant to units of activity depreciation.

# CHAPTER 10

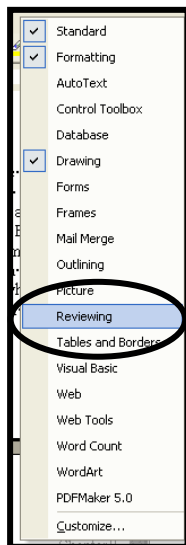
## CHAPTER OUTLINE

Comments  
Linking Worksheets  
Loan Payments  
Payment To Principle

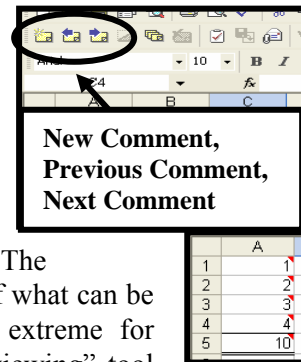
Cumulative Payment To Principle  
Interest Payment  
Cumulative Payment To Interest

## Comments

Frequently the presentation of purely numerical data is insufficient for the effective communication of financial data within a worksheet. At other times you want to document where the data came from or what the data represents. Excel, as shown, will accept text entry into the cells easily and effectively and you have vast formatting capabilities on that text and numerical data. Additionally, Excel presents you with another very effective text presentation mode referred to as “Comments”.



Comments are “Pop-up” blocks associated with a particular cell. They can contain a wide variety of information and the text within the block can be formatted with many of the commands and features found elsewhere in Excel. The



“Comments” data file on the data disk contains examples of what can be done with comments. These examples can be and are extreme for presentation purposes. Comments have icons on the “Reviewing” tool bar or menu listing. The “Reviewing” tool bar can be brought up by right clicking on the menu bars near the top of the screen and selecting “Reviewing” from the pop-up menu.

To attach a comment to a cell follow the path Insert > Comment, right click on the target cell and select “Insert Comment”, or click on the “New Comment” icon on the tool bar – an envelope with an “aura” or “rays” from the upper left corner. The “Comment Box” will pop-up attached to the cell. Contained inside the comment box may be the owner’s name of the Excel program by default. This name can be left or removed. To remove the ownership name from the comment box simply highlight the text and delete it with the “Delete” key. Enter the text and data as you desire. The comment box can be resized to show only part or all of its comments. It can also be repositioned as to the location that it appears in by dragging it. When the data entry is complete simply click on the worksheet outside the comment box and the comment box will disappear. Any cell with a comment attached will bear a red triangle in the upper right corner. You can place your cursor over a comment triangle and the comment will pop-up and remain in view until you reposition the cursor. The Reviewing tool bar need not be active or available to read comments.

If you desire to edit the comment follow the path Insert > Edit Comment, right click on the cell and select the “Edit Comment” option, or click on the “Edit Comment” icon on the tool bar – an envelope with a pencil writing on it. In the edit mode, you can still resize or reposition the comment box or reformat the contents. There is an icon to display all comments and to hide all comments with one key

click. There is also a “Delete Comment” icon on the tool bar. Delete comment is also available through right clicking the cell and selecting that option.

**Tip:** Spell check will scan comment box contents as well as the rest of the worksheet.

## Linking Worksheets

Excel can utilize the “Look to” function as a quick link between worksheets within the same workbook and link between worksheets in difference workbooks. This is different then a link or hyperlink which provides the path which opens a target document. If you are working within the same workbook but different worksheets within Excel simply enter the equal sign into the target cell, select the source worksheet and click into the source cell and press and release the “Enter” key. This is demonstrated in the “Linking” data file on the data disk. On the “Links” worksheet, the “=” (equal sign) was entered into cell A1. Then the Source worksheet was selected and cell A1 was clicked into to make it the source cell and “Enter” was struck. This returns you to the “Links” worksheet as the function is complete. Then cell A1 as selected and the formula within cell A1 was dragged down through cell A5. The dragging operation is relational as explained under Absolute References so the cells A1 through A5 of the Links worksheet are now “children” or “dependents” of the “parent” or “source” cells of the Source worksheet.

Notice the special format and sequence of the linking formula, =Source!A1. This can be typed in manually if desired but it is quicker and less troublesome to let Excel write the formula. You can utilize these cells for data within other formulas and you can add functions and formulas to the linking formula. In cells D4 through D7 additional math actions are added to the linking function.

Linking can also be accomplished through Copy then Paste Special > Paste Link. When done with this method the references are created as Absolute References by Excel, the absolute reference function can be inserted on the “Look to” method as well. This allows the “dependent” or “child” cell to be moved, copied and pasted, or dragged to another location without losing its reference.

When Excel links between two workbooks the formula becomes slightly more complicated. The formula “=[Book3]Sheet1!\$A\$1” inserted into a cell in a workbook other than Book3 would look to Book3 and return the data entered in cell A1. In this formula, the parent and child workbooks are within the same directory. On your data disk is a “Linking Source” data file, another file, “Linking Dependent”, looks to this file to attain data. Ensure that both these files are in the same directory and open the “Linking Dependent” workbook. Upon opening Excel will ask if you want to update the link. Select “Update” and Excel will “read” the “Linking Source” workbook for changes. It will not open the “Linking Source” workbook and it does not need to open the workbook to read the linking data. Assume that the child or dependent file is closed and the source or parent file, “Linking Source” is open and being edited. The child or dependent will not be updated upon saving the source or parent file. However, when the child or dependent file, “Linking Dependent”, is opened, Excel will ask if you want it updated and check for changes if you do.

**Tip:** You have a big, dependent or child file that is critical and numerous individuals can make changes to the parent or source file. Upon opening the file you can select not to update the file and, once open, use File > Save As to save the file as a new name. If you desire you can Copy and Paste Special> Values the entire worksheet to remove the links and turn all the formulas into hard values. Then reopen the (real) child or dependent file, update it, and inspect it. If unacceptable changes have been made to the parent or source data file you have the child saved in a previous, unaffected condition through this technique.

Excel will allow you to link between directories as long as you can define the path or generate the path through Windows movements. With the ability to link the worksheets and workbooks you can build subsidiary ledgers containing accounts receivable and accounts payable data and then link it to the general ledger of accounts receivable and accounts payable in another directory. The subsidiary ledgers would be the source or parent with the general ledger being the child or dependent cells. You would not have to



have the general ledger open to make entries into the subsidiary ledgers. But when the dependent or child workbook, the general ledger file is opened, Excel would ask if you would like to check for changes and update the file. This capability is demonstrated with the data disk directories “Linked Source” and “Linked Child”. The Linked Source directory contains a data file titled “Linking Source - Directory.xls” which is looked to by the child or dependent file titled “Linking Dependent - Directory.xls” in the “Linking Child” directory. The formula in cell A1 of the “Linking Dependent – Directory.xls” file is long and specific to how you copied the files to your directory. If the links have difficulty in reestablishing upon opening, you can reinstate them by opening both files, clicking into cell A1 of the “Linking Dependent - Directory.xls” entering an equal sign, then clicking into cell A1 of the “Linking Source - Directory.xls” data file and striking the Enter key. Now that the formula is in cell A1, remove the absolute reference dollar signs from the cell reference of “\$A\$1” to make it a relational “A1” and drag it down 35 or more rows to bring in the populated cell range of the “Linking Source - Directory.xls” data file. The links are reestablished.

**Clue:** The cell A1 to A1 relationship is not required. You can link any cell to any cell through this process.

The “Linking” and “Look to” capabilities makes Excel a powerful tool for data management. There is a danger created in this manner that the data being utilized to generate values on your worksheets and in your workbooks may not be easily reviewed or visible for review and audit. And, as a professional, you are responsible for the work you provide, regardless of the validity of the source.

## Loan Payments

Excel has numerous formulas that address loan payments. The most commonly used formula is the “PMT” (Payment) formula. This formula is under the “Financial” category. With “PMT” you provide Excel with the period interest rate, the number of periods, the present value, the future value if any, and determine if the payment is made at the beginning or end of the period. The quickest way to access this formula is by clicking on the  $F_x$  of the formula entry window and ask for “PMT” (Payment). Excel will present you with the “PMT” (Payment) dialog box which looks like the box presented later in this section.

The screenshot shows the "Function Arguments" dialog box for the PMT function. The arguments are as follows:

Argument	Value	Result
Rate	9 3/8%/4	= 0.0234375
Nper	10*4	= 40
Pv	10000	= 10000
Fv	0	= 0
Type		= number

Calculates the payment for a loan based on constant payments and a constant interest rate.

**Type** is a logical value: payment at the beginning of the period = 1; payment at the end of the period = 0 or omitted.

Formula result = -387.9278455

Buttons: [Help on this function](#), OK, Cancel

Excel requires the interest to be expressed in the same manner as the periods and the periods are determined by the compounding feature of the loan. If the interest rate is 12% annually but compounded monthly you can enter 12%/12 or 1%. The entry of 12%/12 should be considered safest since you do not have to do math outside the formula to determine values like 9 3/8% interest compounded quarterly, you can enter it as 9 3/8%/4, as shown, rather than calculate it out as 0.0234375 in decimal. You can use parentheses such as (9 3/8%)/4 to ensure the results. And, Excel will take the generated value to appropriate significant digits without interference or limitation. Since the loan is a 10-year loan with quarterly payments you can enter 10\*4 into the Nper or number of periods window. The principle amount is entered in the Pv window. As typical with Excel, no dollar signs or commas are appropriate.

**Clue:** The cash flow direction of the principle is important to Excel. If you enter a positive value into principle value that indicates you are getting the principle and making the payments. As such, the payments will become a negative value indicating cash flows out. If you enter the principle value as a negative number that indicates you are making a loan to someone and the principle is cash out so payments will be positive indicating cash in. In the screen print of the Payments dialog box, the formula results appear to be a negative 387.9278455 so Excel is indicating that the loan is to you and you are going to make payments of \$387.93 at the end of each payment period since the type box contains no declaration and will default to “0” – payment at the end of the period. Had the principle value been negative, the payment would have been positive indicating that you are providing the principle to someone else and someone is making period payments to you.

The “Fv” window is for future value, if the loan has a balloon payment, the value of that payment would be placed in this window. As with principle value, Excel is sensitive as to whether the balloon payment is cash out – negative, or cash in - positive, and this determination will affect the final results.

The “Type” window is where the schedule of payment, at the beginning or the end of the period, is established. The default is 0 (zero) and is assumed to be payment at the end of the period if not provided.

If populated with the provided data, clicking on the OK button will post the formula,  $=\text{PMT}(9.375\%/4, 10*4, 10000, 0)$ , to the worksheet. A review of this formula confirms your data entry. A quick check of the result, \$387.95 X 40 payments indicates that you will be paying approximately \$15,518 in payments over the 10 years of the loan. This value seems reasonable and can be checked with two other Excel formulas “PPMT” and “IPMT”. Examine the “Loan” data file on the data disk to see how a loan table can be built with these formulas as an integral part. The “PMT” formula is found in cell F16 of the “Loan” worksheet and in cell F18 of the “Balloon Payment Loan” worksheet on the “Loan” worksheet in the Loan data file and is referred to in the matrix.

## Payment To Principle

Payment to principle of a loan payment for a period can be determined by the Excel “PPMT” (Payment To Principle) formula. The data windows for this formula are very similar to the data entry windows for the “PMT” (Payment) formula detailed above except that “PPMT” asks for the period that you want the payment to principle for. This can be period 1, period 2, period 40, or any other period in the applicable range of the loan. On the “Loan” data file, this value is defined in column A. In the “Loan” data file, the maximum life of the loan is 100 years with monthly payments. In this example, the range is from 1 to (100 years X 12 months per year) 1,200. The output value is under the same logic as “PMT” – if the principle is positive, the payment will be negative. Examine the “Loan” data file to see an example of how a loan table can be constructed with these formulas. The “PPMT” formula is contained within column D of the “Loan” and “Balloon Payment Loan” worksheet matrix on the “Loan” data file. It looks to column A to see if the line is applicable to the loan – unneeded lines utilize the “null value” to appear clear and clean. The “Null Value” is addressed in its own section elsewhere in this book.

The “PPMT” formula will assist you in determining how much of a loan payment will reduce the obligation of the loan with the payment.

## Cumulative Payment To Principle

The formula “CUMPRINC” will generate the cumulative principle paid or received to date if all payments were made or received appropriately. The dialog box for the “CUMPRINC” formula is shown here. The input values are similar to other loan associated formulas and functions. While this is an easy formula to set up, it does not take into account or have the capability of addressing loans with balloon payments. To overcome this situation, the “Balloon Payment Loan” worksheet of the “Loan” data file

simply uses a “Sum” formula from rows 23 on down in column H. The technique within the “Balloon Payment Loan” worksheet is sum from an absolute reference of row 23 through its relational row as dragged through the matrix so the formula in column H on the “Balloon Payment Loan” worksheet looks like SUM(\$D\$23:D23) since column D contains the payment to principle values. When the formula, with its added “If” statement to provide the null value for a clean appearance if the period is not applicable to the loan, is dragged down the relational “D23” cell reference will increment to the row so the formula in row 24 will appear to be SUM(\$D\$23:D24), thus summing the values of column D rows 23 and 24. The power of Excel can be used to overcome its few faults and weaknesses.

The “CUMPRINC” (Cumulative Payment To Principle) formula is shown in column H on the “Loan” worksheet of the “Loan” data file in column H. However, no balloon payment data can be input on this worksheet.

## Interest Payment

The payment to interest of a loan payment for a period can be determined by the “IPMT” (Payment To Interest) formula of Excel. The dialog box for this formula is very similar to the data entry windows for the “PMT” (Payment) function detailed earlier except that “IPMT” asks for the period that you want the payment to interest for. This can be period 1, period 2, period 40, or any other applicable period within the range of the loan for the loan example. In the “Loan” data file, the period is defined in column A. The output value is under the same logic as “PMT” – if the principle is positive, the payment will be negative, if the principle is negative, the payment will be positive indicating cash flows in and out.

This formula is contained within column E of the “Loan” and “Balloon Payment Loan” matrix in the “Loan” data file. The “If” statement determines if the period is applicable to the loan. If the period is not relevant to the loan, the “If” statement returns the null value for a clean and clear presentation. If the period is applicable, the “IPMT” formula looks to the input data through absolute reference to attain the values for the “IPMT” formula.

Examine the “Loan” data file to see an example of how a loan table can be constructed incorporating this formula.

The “IPMT” formula will assist you in determining how much of a loan payment will be the interest cost value associated with the loan with the payment.

The screenshot shows the 'Function Arguments' dialog box for the CUMPRINC function. The arguments are: Rate: 8%/12 (0.006666667), Nper: 1200, Pv: 15000000, Start\_period: 1, End\_period: 10, and Type: 0. The result is -355.1308798. The description states: 'Returns the cumulative principal paid on a loan between two periods. Nper is the total number of payment periods.' The formula result is -355.1308798.

The screenshot shows the 'Function Arguments' dialog box for the IPMT function. The arguments are: Rate: 8%/12 (0.006666667), Per: 1, Nper: 1200, Pv: -15000000, Fv: -5000, and Type: 0. The result is 100000. The description states: 'Returns the interest payment for a given period for an investment, based on periodic, constant payments and a constant interest rate. Per is the period for which you want to find the interest and must be in the range 1 to Nper.' The formula result is 100000.

### **Cumulative Payment To Interest**

The “CUMIPMT” (Cumulative Payment to Interest) formula will generate the interest for a range of periods rather than one specific period. Its dialog box is very similar to the “CUMPRINC” (Cumulative Payment To Principle) discussed earlier. As with the “CUMPRINC” (Cumulative Payment To Principle) formula, this formula does not take balloon payments into account. Due to the fact that the “Balloon Payment Loan” worksheet was constructed to take balloon payments into account, this formula was not usable in that data file structure so the sum function discussed under the “Cumulative Payments To Principle” section was utilized in column I of the “Balloon Payment Loan” worksheet. This formula can be seen in column I of the “Loan” worksheet of the data file.

# CHAPTER 11

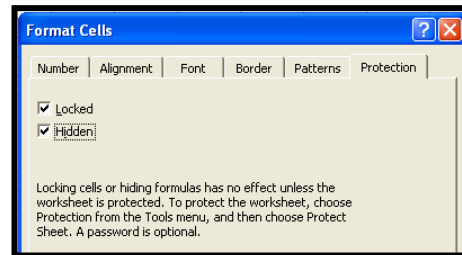
## CHAPTER OUTLINE

Protection  
Hidden

Find And Replace  
If Statements

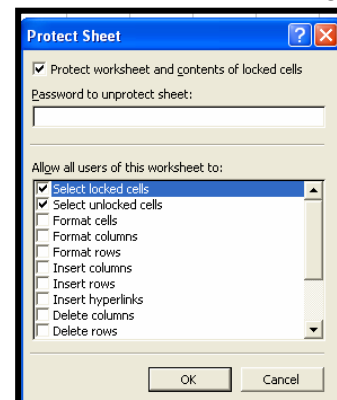
## Protection

In the “Protection” data file on the data disk search for the text strings “Hi!!!!” and “You found it!!!!” and you will find them in cells R555 and R556 respectively. However, there is one more occurrence of each on the worksheet. The “Protection” worksheet has had the cells round cells Y571 and Y572 formatted to “Locked” and “Hidden” through the “Format Cells” dialog box’s “Protection” tab, shown here, and then the worksheet was protected through the path Tools > Protection > Protect Sheet. There is no password so you may remove the protection if you desire. Even clicking into the cells will not reveal their contained text in the formula input window of Excel, but that text will be visible in the cells when the cells are highlighted. This text has been additionally hidden with white text formatting to make it harder to find, had it been black or another color text, it would have been visible without highlighting.



Why have a “Protection” capability within Excel? You have assembled a large worksheet of inventory data consisting of thousands of lines of data and are about to distribute it for a meeting to be held in three days after the participants have had time to review it. “Protection” will preclude them from modifying their received file providing you a common reference document in the meeting. Or, because you are building templates and standardized worksheets and workbooks for the organization, you can structure the worksheet or workbook as you like and then format the areas you do not want modified leaving the user input areas open and available. Starting at the cell A34 and continuing down and right, part of the “Demo File” is pasted. The entire range of the demo file was protected, (for speed). Then the protection was removed from cells with the yellow highlighting by clicking into one cell and holding the Ctrl (Control) key down and clicking into the rest of the cells one by one. (This task was actually done in smaller steps for speed and accuracy.). Once all the highlighted cells were selected, one cell was right clicked and through the “Format Cells” option and the “Protection” tab, the “Locked” and “Hidden” formatting was removed. Then the worksheet was protected – without a password through Tools > Protection > Protect Sheet. As an exercise, enter your name in the “Name:” entry area identified by the yellow filled highlighting. Not a problem. Try to change the “Instructor:” title to “Professor:”. Excel presents you with an advisory that the worksheet is protected and that capability is not available. This maintains standardization of the worksheet. The rest of the demo problem is protected so that data can only be placed in the yellow highlighted cells. Restricting your ability to edit or change the data.

**Note:** None of the exercise and problem templates are protected so you have maximum flexibility within the data files. So exercise due care



when working with these data files.

“Protection” requires several actions to be effective. First, the general default of Excel is that every cell, if protection is invoked on the worksheet, will be protected. A good, safe, default but seldom a valid statement. Since you want to insure the configure of all of your cells, select the entire worksheet through the “Select all” button above the first row number and to the left of column A indicator or use the keystrokes Ctrl-A. Next, right click the worksheet to get the pop-up menu and select “Format Cells” or follow the path Format > Cells to get the “Format Cells” dialog box, and select the “Protection” tab. Then, with the assumption that you want to protect most of the worksheet, or remove the checkmark from “Locked” allowing all the cells not later identified to be utilized by the user to be unprotected then click “OK”. Now, if you selected “Locked” while the worksheet was selected, click into the cells to select the cells you want the user to have access to and, with access to the “Format Cells” dialog box, remove the checkmark from “Locked”. You can access and format more than one cell at a time by holding the Ctrl (Control) key down while selecting cells by clicking on them. Again clicking “OK” at the completion of each selection process. If you unlocked all of the cells and then select the few cells you want to protect, you would place a check mark in the “Locked” window after selecting the cells you wanted locked. Then you would click “OK” to complete the selection process.

After all the cells have been configured as “Locked” or not locked by removing the checkmark in locked, follow the path Tools > Protection > Protect Sheet. The resulting pop-up dialog box will ask what privileges you wish to make available to the user and if you want to utilize password protection. If you do not provide a password, the simple process of Tools > Protection > Unprotect Sheet will remove the protection. This was the level provided on any protected worksheets on the data disk. If a password is utilized, make sure you can recover the password later as recovery of the worksheet may be very difficult without it. Clicking “OK” will complete the process and activate the protection. The workbook now needs to be saved to record this configuration into the file on the computer media. This does not make the workbook a template or make the workbook a read only document.

**Tip:** By accepting the defaults of allowing a user to select locked and unlocked cells you can copy a protected worksheet and paste it into a new document recovering part of your “frozen” work if you lose the password.

## Hidden

The “Hidden” capability within Excel is controlled through the “Protection” tab of the “Format Cells” dialog box. The path to this tab is right click on a cell and select “Format Cells” from the pop-up menu then the “Protection” tab on the “Format Cells” dialog box or follow the path Format > Cells to the “Format Cells” dialog box and select the “Protection” tab. The “Protection” data file can be utilized for this section.

Assume you are giving a presentation and using Excel as a presentation tool. The worksheet is extensive and has numerous large formulas contained within it. The object of the presentation is to convey the information, not have the audience to stare in awe of your formula construction while you are trying to convey your message. So you can make the formula bar and formula input window disappear by following the path Tools > Options > View and remove the checkmark from “Formula Bar”. You can right click the menu bars and uncheck all of the unwanted and unneeded menu and task bars and make them disappear. You can format your cells to “Hidden” by highlighting an area of cells or the entire worksheet and right clicking to get the pop-up menu and select “Format Cells” or follow the path Format > Cells and then format the cells to “Hidden” by insuring a non-faded checkmark is in the “Hidden” box. Now invoking worksheet protection through Tools > Protection > Protect Sheet will minimize the appearance of formulas as you click on the worksheet. The results of the formula are still shown.

By formatting any unnecessary for presentation intermediate formulas and unwanted text and cells to a text coloring the same as the background or fill coloring before protecting the worksheet these

unnecessary items will cause less distraction as they will be hidden - white ink on white paper type printing. To remove this later simply select the entire worksheet and format all text coloring to “Automatic” or whatever color you choose through the “Format Cells” dialog box.

**Tip:** You can also use “Full Screen” through the path View > Full Screen. There is an icon to return to “Normal” view. If you close that icon off your screen for viewing purposes, you still have the main menu bar at the top of the screen and can follow the path View > Full Screen, a toggle switch, to get back to your normal default view.

**Clue:** The Excel scroll bars will tell you the general data area of a worksheet. If you open a worksheet and the scroll bars fill the slide area, you are generally looking at the total data entry area. If the scroll bars are little bars in a large slide area, the data area is rather large. Excel remembers where the data is and allows you to use the scroll bars to get to it. And, even a “ ” (space) inserted 250 rows below the last data row and 50 columns to the right of the last data column will cause the scroll bars to change and represent this placement.

## Find And Replace

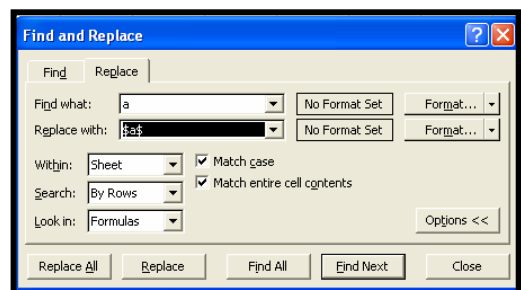
Excel has a “Find And Replace” function that is considered an added option of the “Replace” function. This function is activated by the keystrokes Ctrl-H, by following the path Edit > Find and Replace, or by selecting “Options” on the “Find” function accessed through Ctrl-F. The “Find and Replace” function is powerful *and dangerous* as well as extremely useful.

**Tip:** One of the safest ways to control “Find and Replace” is to limit its range by selecting a column, a row, or a range of cells rather than letting it roam the worksheet. The second safest thing (not in any order) is to utilize the “Find Next” button and then determine if you want the item found replaced or not. If you do, click the “Replace” button and Excel will replace that one item and then find the next item and ask for approval before replacing that item. If you do not want that one item replaced, click the “Find Next” button and Excel will move on without replacing it.

The “Find and Replace” worksheet is available for a minor exercise. Open up the “Find and Replace” data file and click into cells C5 and D5. This range selection will contain Excel’s find and replace powers to two cells for the demonstration. Use the keystrokes Ctrl-H to bring up the “Find and Replace” dialog box. Since you want the formula in cell D5 to be absolute referenced so you can copy it to other locations without changing its relational reference, tell Excel to find the letter A in the “Find What” window. Upper or lower case does not matter. In the “Replace With” window tell Excel to replace it with “\$A\$”. This will establish absolute reference for both column and row as the resulting formula will be “=SUM(\$A\$1:\$A\$5)+SUM(\$A\$7:\$A\$11)+SUM(\$A\$13:\$A\$17) from =SUM(A1:A5)+SUM(A7:A11)+SUM(A13:A17)”.

However, when “Replace All” is clicked cell C5 changes from ABCabc to \$A\$BC\$A\$bc. Had only one cell been selected on the worksheet Excel would have replaced every letter A on the worksheet, upper or lower case, with \$A\$ as fast as your processor can process the request. Excel will correct the situation by clicking on the “Undo” arrow on the task bar. – unless a “Save” operation has been initiated. Since the goal is to make the formula in cell D5 absolute reference from relational and we do not want any other cells to be affected, and if only one cell is selected, Excel will find and replace on the entire work sheet the key is to utilize “Find Next” rather than “Replace All”. With “Find Next”, Excel will identify the next letter found and “ask” what you want done – “Replace”, “Replace All”, “Find Next”, or “Close”. By selecting “Find Next” and then “Replace”, Excel is contained appropriately.

Excel’s “Find and Replace”, through “Options”, will also find formats and specific conditions. Click into cell D5



and bring up the “Find and Replace” dialog box. Click the “Options” button on the dialog box and click to insert checkmarks into “Match Case” and “Match Entire Cell Contents”. Then click on “Replace All”. Excel will replace only one item on the entire worksheet – cell D13 if your “A” was upper case and cell D14 if your “a” was lower case. Remove these two checkmarks for the next exercise.

As a general rule, the exercises and templates are formatted to Arial and 10 point font. However, one cell is formatted to Times New Roman and 12-point size font. The goal is to change that unique formatting to the conventional formatting through “Find and Replace”. Clear the entries in the “Find What” and “Replace With” windows since these are “limiters” and the goal is to replace all of the font with this unique formatting with Arial and 10 point formatting. Click into “Format” on the “Find What” line and set the font to “Times New Roman” and “12” point size. Then click “OK”. Click on the “Replace With” line’s “Format” button. Set the font to “Arial” and the points size to “10” and click “OK”. Then click “Replace All”. Excel should find one occurrence to replace. Major power here is that you do not have to limit the “Find and Replace” function by input values in the “Find What” and “Replace With” windows. You can search for borders, fills, font colors, and other options without regard as to where it is or how it is utilized.

Also available is the ability to control the direction of processing – by rows or columns. With “Find” you can control whether Excel will look in formulas and comment boxes. With “Find and Replace” Excel will process all elements meeting its criteria so self control is important.

**Tip:** Use your imagination to control “Find and Replace”, or the undo arrow, or your results may not be what is expected. Excel’s “Find and Replace” is powerful and quite useful.

**Clue:** One of the options in “Find and Replace”, like in “Find”, is to do a find and replace on the entire workbook. While powerful, workbooks may contain many more relationships than visible on the worksheet. This function is very powerful – and dangerous.

## If Statement

As shown throughout this text and as utilized extensively throughout the exercise and problem templates, the “If” statement is a very powerful and easy to use logic tool. The “If” statement works on the principle of comparing term one with term two and if the terms make the condition true, it replies with the first field after the comparison, if the comparison is false, it replies with the second. The first and/or second field can be another “If” statement value, formula, or text. The formula format is “=IF(2=2,4,0)”. In this simple “If” statement if 2 equals 2 the formula will put 4 in the cell, if 2 does not equal 2 the formula will put 0 in the cell. Since 2 does equal 2 the response will be 4. This is shown in cell A1 of the “If Statement” data file. However, the statement “=IF(2=Two,4,0)” will result in an error presentation since text strings such as “Two” inside formulas must be contained within quotation marks such as “=IF(2=“Two”,4,0)”. This is shown in cell A2 of the “If Statement” data file. If the statement is entered into Excel as “=IF(2=“Two”,4,0)”, as it is on the “If Statement” data file in cell A3, the response will be 0 as the number “2” is not equal to a text string of the letters “T”, “w”, and “o”. As stated earlier, Excel does not read English, but it can compare text strings through spell check, F7, which is in reality, a big “If” statement – if the text string being evaluated matches text strings found in the reference file, look at the next text string, if the text string is not in the reference file, bring up the dialog box and ask for help.

Excel will compare text strings and provide responses as instructed. For example, the “If” statement “=IF(“Two”=“Two”,4,0)” will return the value 4, as shown in cell A4, not because it is the sum of Two + Two, but because the two text strings are equal, as asked, so the first field or the “True” term following a true statement, is returned.

**Tip:** There is a detail of Excel that needs to be appreciated in all of the comparative statements. If the value of 123.451 is entered into a cell with formatting to display two decimal places the entered value will display as 123.45 but Excel will remember and respond as if it is 123.451. If the value 123.451 displayed as 123.45 is compared to a displayed value of 123.45 which is in a cell formatted to display two decimal



places but that value is actually 123.452, the values appear to be equal, as presented in the formatted cells, but they are not. Examine the data in the range of E1 through F2 on the “If Statement” data file.

When Excel compares values and the formatting of numerical information is different, for example “Accounting” with 2 decimals and “Currency” or “General” to 4 decimal places, Excel will ignore the formatting and compare the values. However, it is possible to have what appears to be a numerical value such as the 25 contained in cell J1 not be equal to the 25 in J2 since cell J1 as formatted to text before the 25 was entered and, since cell J2 is formatted to General by default, that 25 is numerical and text 25s are not equal to numerical 25s.

**Hint:** Try to think of questions that are answered True/False or Yes/No with “If” statements.

The following is a table containing most of the comparison operators available to the “If” statement:

= (equal sign) if the first comparative term is equal to the second comparative term, the first field or the true field will be returned, if the comparison is false, the second field or the false field will be returned. Your question is “Is it true that the first comparative term is equal to the second comparative term?”

< > (not equal to sign) (The order of the operators is important!) If the first comparative term is **NOT** equal to the second comparative term, the first field or the true field will be returned, if the comparison is false, the second field or the false field will be returned. Your question is “Is it true that the first comparative term is **NOT** equal to the second comparative term?”

> (greater than sign) If the first comparative term is greater than the second comparative term, the first field or the true field will be returned, if the comparison is false, the second field or the false field will be returned. Your question is “Is it true that the first comparative term is greater than the second comparative term?”

< (less than sign) If the first comparative term is less than the second comparative term, the first field or the true field will be returned, if the comparison is false, the second field or the false field will be returned. Your question is “Is it true that the first comparative term is less than the second comparative term?”

> = (greater than or equal to sign) (The order of the operators is important!) If the first comparative term is greater than or equal to the second comparative term, the first field or the true field will be returned, if the comparison is false, the second field or the false field will be returned. Your question is “Is it true that the first comparative term is greater than or equal to the second comparative term?”

<= (less than or equal to sign) (The order of the operators is important!) If the first comparative term is less than or equal to the second comparative term, the first field or the true field will be returned, if the comparison is false, the second field or the false field will be returned. Your question is “Is it true that the first comparative term is less than or equal to the second comparative term?”

“If” statements can be imbedded in other formulas and can be embedded within themselves. The maximum is seven layers deep. However, with the ability of Excel to run an “If” statement on the results of an “If” statement, the seven layer depth restriction is of little concern. If you examine the formulas in the range of D21 through M26, the “If” statements are embedded upon each other to respond to the input of cell D22. If the answer is not contained within E22’s string of “If” statements, then E22 looks to E23 for an answer. If E23 does not know the answer, E23 looks to cell E24 for the answer. And it continues down into cell E26. If all of the possibilities are exhausted, E26’s last option is to respond with the phrase “I asked you to pick a letter, not a number or a special character. Please try again.”, which is the last false condition respond for the chain.

**Hint:** Read the section on the “And” function as an additional capability for the “If” statement.

# CHAPTER 12

## CHAPTER OUTLINE

Subtotal  
Vlookup  
Charting

Go To  
Keystrokes & Shortcuts

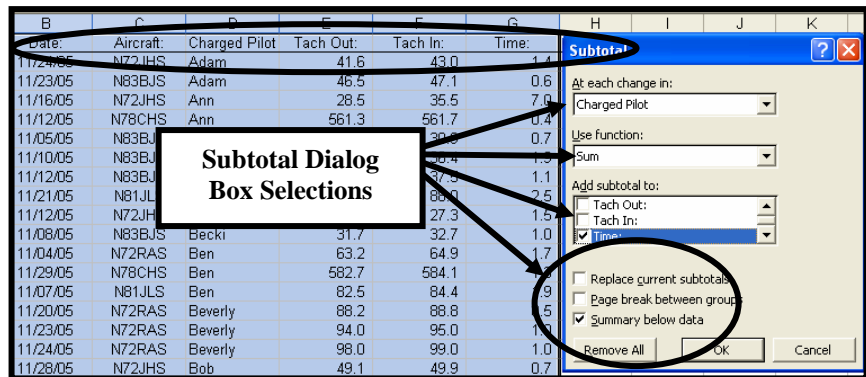
### Subtotal

“Subtotal” is a tool that requires more show than tell to explain. What does “Subtotal” do? It tells you, for example, all of the flight time Adam, Ann, and the rest of the pilots have flown, and what airplanes they flew in as well, as the flight time for the aircraft and the total flight time. “Subtotal” requires that the worksheet be sorted by the basic order for the subtotaling operation since “Subtotals” only on the rows format and has no sorting capability within itself. The “Subtotal” workbook on the data disk was built for this purpose. With the “Subtotal” data file you will need to first sort the data by “Charged Pilot”, then by “Aircraft”, then by “Date”. This will structure and sequence the data to be “subtotaled” by Excel.

**Hint:** If you click and highlight your data area to confine the process and avoid taking in extra rows and columns, Excel may give you an advisory about header rows when you initiate “Subtotal”. Usually simply acknowledge the message if you know what caused it. If you simply click on a cell and then follow the path Data > Subtotal this advisory message will usually not appear, but you may end up with extra rows in your data matrix.

**Tip:** – identify the data **ROWS** and accept / acknowledge the message.

Highlight the rows from row 1 through and including row 147. (This will cause an advisory message about header rows that is not a factor in this data structure.) Then follow the path Data > Subtotals and the “Subtotal” dialog box will pop up. Within this dialog box, set the “At Each Change In” window to “Charged Pilot” through the drop down menu list accessed by clicking on the drop down arrow to the right side of the window. Other options are available but the data file must be sorted to handle the selection sequence – if you sort the data file by “Date” and then subtotal by changes in “Charged Pilot” the resulting matrix will be useless.



In the “Use Function” window ensure that it reads “Sum” There are other mathematical operations available and you should check these to see your options but you will be using “Sum” in this example.

In the “Add Subtotals To” window scroll up or down to see and select “Time” from the selection. Ensure that all other items are clear of checkmarks. Then ensure that “Summary Below Data” is checked. Since this is the first subtotal process on the worksheet, “Replace Current Subtotals” can be checked or unchecked. This, while not important now, will be important shortly.

Before you click “OK”, what has been done is, you have sorted (earlier) a data matrix into the order of “Charged Pilot”, “Aircraft”, and “Date”. Now you are telling Excel to determine the amount of hours each pilot has flown for this data period by aircraft in date order.

Click “OK” on the dialog box and watch the worksheet change.

The worksheet has new “scroll” bars (discussed soon) to the left and new rows inserted. These rows contain the data you asked for in the first run of the “Subtotal” dialog box. Each pilot’s total flight time is now in the “Time” column. Looking at the screen print of the results you can see that “Adam” flew a total of 2.0 hours and Ann flew 7.4 hours.

Charged Pilot	Tach Out:	Tach In:	Time:
Adam	41.6	43.0	1.4
Adam	46.5	47.1	0.6
<b>Adam Total</b>			2.0
Ann	28.5	35.5	7.0
Ann	561.3	561.7	0.4
<b>Ann Total</b>			7.4
Anna	30.1	30.9	0.7

Now, add a data management feature to the worksheet. In the “First Subtotal” column enter a “2” in row 2, in row 3 enter a “3”, in row four enter a “4” and then highlight these three cells and drag and fill the cells down by grabbing the bottom right corner of the highlighted box when your cursor becomes a heavy dark cross. You should be dragging down through the bottom of the data matrix, now row 210. You may use this later.

The next subtotal process will address the next issue. Each aircraft has its own billing rate and numerous pilots flew several aircraft during the period. So, select the rows from 1 through 210 – the subtotal process increased the number of rows as it added Adam’s and Ann’s subtotals as well as everyone else’s. Follow the path Data > Subtotal again. This time in the “At Each Change In” window select “Change in Aircraft”, ensure that the function is still “Sum”, and the “Add Subtotals To” is “Time”. This time, you do not want to remove the previous subtotals so ensure at there is no checkmark in the “Replace Current Subtotals” box. If there is or if there is a faded one there, mouse click it until the box is clear. Now click “OK” and watch the worksheet change again.

Now put a “2” in row 2 of the “Second Subtotal” column, a “3” in the third row, and a “4” in the fourth row. Then highlight these three cells and drag and fill the column through the data matrix and down through row 303. Excel and Subtotal has added numerous rows to the basic file. Use any of the “Save” procedures to save the workbook.

Now the worksheet has more “scroll” bars to the left and more inserted lines. In this process, use the scroll bars to the right and scroll through the data. You will see that, where a pilot has flown more than one aircraft in the period, such as Deanna, Excel has subtotaled her flight time in N72RAS as 4.4 hours, N78CHS as 1.5 hours, and N81JLS as 0.9 hours. Excel also tells you that Deanna flew a total of 6.8 hours.

Another data management issue, column J is titled “Names”. In the J1 cell, enter the formula “=IF(D2="",J1,D2)” and drag it down through row 301 of the matrix. If you drag it into row 302 in this example you will “credit” Zoë with the grand totals. Not harmful, just incorrect. This column will be discussed shortly. Save the workbook to protect and preserve your work.

Now, those new “scroll” bars to the left. At the top of those bars are some new blocks with numbers indicating levels of data that can be presented. In this example, level 4 is “Full Detail Shown”, the default screen. Click on the level 3 box in the data file and you have a good presentation to do billing from. Detail is gone but subtotals are clean and crisply presented so you do not need to find the subtotal within the detail. Printing at this point will be what you see – summary down to pilot and aircraft. Make sure you define the print area as you do not need sort columns and unnecessary data. Click on the level 2 box and you can verify the total hours flown by each pilot, and you are not looking at the subtotals by aircraft detail. Click on the level 1 box and you are told that your total billing for this period should be 183.7 hours. A nice cross check. Click back into the level 4 box to get full detail shown again. By clicking on the minus signs on those new scroll bars data will disappear through their associated rows and the minus

sign will be replaced with a plus sign. The horizontal position or orientation in relation to the level boxes at the top clue you into which data will be hidden or exposed by your clicks.

Click into the “Time” cells of any of the new rows where data appears and you will see new Excel formulas within the cells. In cell G3 Excel and the “Subtotal” has inserted the formula “=SUBTOTAL(9,G2:G2)”. The “9” within the formula tells Excel this is a summing formula. The range is G2 through G2. If you open Excel help and type “Subtotal Worksheet Function” you will see the numerical drivers for the other subtotal functions – if you are interested.

This worksheet contains a lot of formulas and dynamic worksheets can lead to problems. To address this minor issue, click into the Subtotal’s worksheet and select all cells by clicking on the “Select All” button or the keystrokes Ctrl (Control)-A. Then copy the worksheet through any of the numerous copy methods such as Ctrl (Control)-C, the copy icon on the task bar, or through the path Edit > Copy. Now click into the “Invoicing” worksheet of the Subtotal workbook. Make cell A1 the active cell. Right click cell A1 cell, select “Paste Special” from the options and select “Values” from the dialog box. Now the Subtotals worksheet is pasted into the “Invoicing” worksheet without the formulas.

Select row 2 and then follow the path Window > Freeze Pane. If row 1 is already frozen through the paste process, this is not necessary. This will “freeze” row 1 as a header row. To remove subtotal bars from the “Invoicing” worksheet follow the path Data > Subtotal again for the pop-up dialog box. This time select the “Remove All” option and click “OK”. Excel removes the subtotal features. No values are lost since “Subtotals” will only remove formulas it placed and the new “Scroll Bars” it inserted and you removed those formulas with the Paste Special > Values operation just performed.

Now the reason for that “Name” and those various “Sort” columns. Select the entire worksheet in any manner you like and follow the path Data > Sort. Ensure “Header Rows” is identified on the dialog box. Then select “Sort Column”, (column A of the worksheet) which represents the original data input sequence. Select “Names” in the “Then By” window. The last “Then By” window can be left blank. Then click “OK” and watch the results.



You now have original data entry sequence in rows 2 through 147. In rows 148 through 303 you have pilot subtotals by aircraft and totals flight times – without formulas. However, notice that the presentation of data is not real good. The detail of aircraft is in column B and the hours are in column G. To solve this issue, write the following formula in cell K148 “=IF(C148="",CONCATENATE(D148," ",G148),CONCATENATE(J148," ",C148," ",G148))”. This formula will look at cell D148 to see if there is anything there. If there is not (the “” - null value), it will “Concatenate” or make a text string out of the contents of cells D148 and G148 separated by a space. These cells contain the pilot’s name with the word “total” inserted by the subtotal operation and the total flight time. If there is anything in cell D148, this formula will “Concatenate” or make a text string out of the contents of cells J148, C148, and G148 (in that order) and separate them by a space. These cells contain the pilot’s name, the aircraft identification, and the flight time for that aircraft by that pilot. Since the formula is relational, it can be dragged down through row 301. Since it is a formula, copy column K and utilize Paste Special > Values to paste it back in as values. Now the text strings can be moved or copied and they will retain their value. This gives nice summary presentation for invoicing and records.

Save the data file in its current format to protect your work to this point.

Now that you have pilot invoicing detail on the pilots, you need activity by aircraft. Click into the “Subtotals” worksheet and follow the path “Data > Subtotals to the “Subtotal” dialog box. Click on the “Remove All” button. None of your data is lost since you copied it as “hard values” to the “Invoicing” worksheet. Select all the cells and sort the “Subtotal” worksheet by “Aircraft” and “Then By” “Tach Out”. This will sort the data by the aircraft and by the sequence of utilization in the event that the data entry order was not sequential. Once again populate the “First Subtotal” column’s row two with “2”, row

three with “3”, and row four with “4” replacing any data there and then drag down the column through row 147 (in this example) to populate the cells.

Select the entire worksheet or all the rows of the data matrix. Then utilize the “Subtotal” function with “Change In” “Aircraft”, “Use Function” of “Sum”, and “Add Subtotal To” of “Time” and remove all other checkmarks in this category. Then click on “OK”. Subtotal will again insert new features on the worksheet. In the “Second Subtotal” column, once again populate row two with “2”, row three with “3”, and row four with “4” and then drag down the column through row 154 (in this example) to populate the cells, replacing any data existing there. If there is data below the current data matrix from an earlier process, delete or erase it. Select the entire worksheet and “Copy” the worksheet. Now select the “Aircraft Activities” worksheet. Utilize Paste Special > Values in cell A1 to place the data and remove the dynamic or live formulas into the worksheet. Then remove the “Subtotal” function through Data > Subtotals > Remove All. Now, ensure all cells are selected and resort the worksheet with “Sort By” set to “First Subtotal” and “Then By” set to “Second Subtotal”. The second “Then By” can be set to “None”.

The result will be a sequential presentation of aircraft utilization by aircraft in rows 2 through 147 and a nice summary of aircraft utilization in rows 148 through 153. You could place the formula “=CONCATENATE(C148," ",G148," hours)” in cell J148 (of this example) to make a nice text string presentation and drag that formula through row 153 if desired. If you do, consider Copy > Paste Special > Values to remove the formulas.

Save your data again to protect your efforts. You can return to the “Subtotal” worksheet and removal all the “Subtotal” functions and resort by the “Sort Column” which will return your data matrix to input order. No data will be lost since the aircraft activity data is now on the “Aircraft Activities” worksheet as “hard values”.

## Vlookup

Vlookup is another powerful presentation tool of Excel that takes more show than tell to explain. There is a “Vlookup” data file for this explanation. The “Vlookup” formula is located under the “Lookup and Reference” category. In cell G5 of the “Vlookup” worksheet the formula looks like this:

```
=VLOOKUP($F5,$A$5:$E$6,2,FALSE)
```

The “decode” of this formula is that cell F2 contains the “Seeking value” that Excel and “Vlookup” is seeking in the data matrix. The range \$A\$5:\$E\$6 defines where Excel and “Vlookup” are seeking a match. Excel will only look DOWN the first column, the A column in this case, to find the match even though the matrix extends to column E.

***Hint:*** Excel does not put absolute references into the formula so these were inserted so the formula could be dragged down the “Vlookup” worksheet. The absolute reference on the “seeking value”, the \$F5 was manually absolute referenced by column so the formula could be copied right into then next two columns.

The “2” is telling Excel to return the value found in the second column of the data matrix on the same line if it finds a match to the “seeking value”, the value contained in cell F5 in this example. This is not column B of the worksheet except by coincidence. Excel counts columns from the left most column of the data matrix towards the right. This value will not change as the formula is copied or dragged from cell to cell since it is not “relational”. The “False” tells Excel and “Vlookup” that if you do not find an exact match to the “seeking value”, return nothing other than an “Alert” message. If this field is left blank Excel and “Vlookup” will return the preceding value to the seeking value not to exceed the seeking value. This can be dangerous and, as an accountant, do you want formulas returning unknown assumptions? The “false” declaration will return a #N/A# if no exact match to the “Seeking value” is found in the data matrix.

On the “Vlookup” worksheet there is are several data matrices so the data matrix identification changes with the “Vlookup” formula location and purpose. In cells G5 through H14 “Vlookup” is looking

at the matrix defined by “\$A\$5:\$E\$6” which allows the part to be identified as a pen or pencil part. In cells J5 through K14 “Vlookup” is looking at a matrix defined by “\$A\$9:\$E\$12” which defines the finish of the pen or pencil. In cells M5 through N14 “Vlookup” is looking at a matrix defined by “\$A\$15:\$D\$16” which informs the part reader if the part is an upper or lower assembly of the pen or pencil. In cells P5 through Q14 “Vlookup” is looking at a matrix defined by “\$A\$19:\$E\$27” which defines the actual pen or pencil part.

When the formula is written in cell G5 as “=VLOOKUP(\$F5,\$A\$5:\$E\$6,2,FALSE)” it can be dragged down the rows through 14 and maintain correct orientation and alignment. If you had not made data matrix absolute reference, when you dragged the formula from cell G5 down to G14, the data matrix rows would have indexed accordingly and alignment would have been lost. Now you can copy the formula in cell G5 to cell H5. If the column reference of F had not been absolute, it would have incremented to the right by one and that integrity would have been lost since you are not seeking a match to the value in cell G5. Now you can change column value within the “Vlookup” formula to return from “2” to “4” and the formula will return the value in the fourth column of the matrix when it finds a match. Since this matrix contains merged cells – columns B and C were merged into one column, the next column over is considered column number 4. When this change is made, the formula can be dragged from row 5 down through row 14 and it will maintain proper alignment. Now the formula can be written into cell J5 as “=VLOOKUP(\$I5,\$A\$9:\$E\$12,2,FALSE)” and dragged down and then copied from cell J5 into K5 and edited to seek the fourth column and dragged down through row 14.

Since the formulas are “live” or “dynamic”, you can change any of the values that the “Vlookup” formula is seeking and you can see the results change almost instantly. Written into the matrix defined by G2 through I20 is a grouping of “Vlookup” formulas looking at this feeder matrix. Replacing a number in column F will cause the “Vlookup” formulas in columns G through I to scan the first column and first column only of the table defined in the formula as A1 through D71 for that number. If the function finds an exact match, as controlled by the true/false statement, Excel will return the values of the second column of the table in column G, the value found in the third column in column H, and the value found in the fourth column in column I.

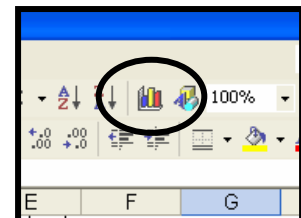
**Tip:** Important issue with “Vlookup”. If you are seeking a value that appears in the data matrix more than once “Vlookup” will complete its search on the first value found. If you are using the “True” in the formula instead of “False”, make sure your data is sorted in ascending order since “Vlookup” will complete its search upon finding the first value equal to or exceeding its “seeking value” and return the (first) the exact match value or (second) the highest value not to exceed the seeking value. Even if an exact match is lower in the data matrix.

There is an area on the “Vlookup” worksheet that shows how “Vlookup” can be used to assemble a mailing label by entering one number in cell G37. Reading the formula will tell you where the “seeking value” is, the data matrix, and verification that you only want exact matches.

**Hint:** “Vlookup” is structured for data in a vertical format. If your data is in a horizontal format, utilize “Hlookup” which works in the same manner for data in a horizontal format.

## Charting

Excel will assist you in making charts through the Chart Wizard. This wizard is accessed through the charting icon on the task bar shown here or through the path Insert > Chart. There are functional examples of charts on the “Charting” workbook of the data files. One of the most important concerns in charting is picking an appropriate chart type for your data. In the examples in the “Charting” data file the information supplied is “Sales item”, “Cost of Sales”, and “Sales Revenues” (per sale item). This information is charted as examples in several ways. The use of the two charts titled “Cost of Sales” and “Sales Revenues”,



both pie charts, may be appropriate for the conveyance of the specific information of Cost of Sales or Sales Revenues - clear, and somewhat attractive. However, when the goal is to show the relationship between costs of goods sold and sales revenues of the individual items the goal is not accomplished by these two pie charts as they are relationally sized amongst their contained data. Both charts would be 360 degrees if one contained \$1 and the other contained \$1,000,000 so the relationship ***BETWEEN*** the charts is not clear. To portray the information required, additional charts must be constructed and a pie chart format may be inappropriate. By utilizing the Column (Vertical bars) chart, shown on the worksheet in “Bad Columns” (off to the right), the cost of sales and sales revenues relationship is clear and distinct in a single chart but, by default, the data is incorrect. When left to the defaults, “Charting” actually summed the cost of sales and sales revenues into a nonsense number. It is corrected by computing the “Gross Profit = Sales Revenues less Cost of Sales”. So another column or field was constructed to be referenced – the “Gross Profit” column. While the charts utilize “Sales revenues” for a title, “Gross Profit” is utilized for numerical data. You can see this by right clicking on a blank area of the chart and then selecting “Data Source” from the pop-up menu. By clicking on the “Series” items of the dialog box you can inspect the way titles and data matrices can be related. The relationship of sales revenues – total height, to cost of goods sold, is now clear.

On the “Charting” worksheet is an Area chart and a Surface chart. The area chart infers that there is a flow over a span of time or a link in the chain of events that may not correct. So, while the chart looks nice, what does it convey without explanation? For this example data, the Bar chart may be a better visual presentation.

***Tip:*** To obtain the best guidance as to which chart type to use to convey what information, scan your textbooks as well as professional publications conveying the same type of information and look at the chart or graph styles used by the professionals.

The quickest way to build a chart within Excel is to highlight the data range before selecting the Chart Wizard. For the data file, this is from cell A1 through D6. You can use the data on the Working Chart Area worksheet of the data file if you desire for this exercise. The incorporation of the totals line may add an additional, unwanted, field that may have to be removed later. Now click on the Chart Wizard icon. The Chart Wizard will walk you through the process first by selecting a chart type. Excel has many chart types and by utilizing the “Press and hold to view sample” button at the bottom of the Wizard box you will see your data in the chart mode selected – one reason why your data was highlighted before selecting the Chart Wizard icon. Since charts are easily made, edited, and removed, try any chart you desire – except a valid type for the data. A correction mode will be shown later. With the (incorrect) chart type picked, click on the “Next” button and the Chart Wizard will ask you to confirm the data range and series. Check both tabs. If satisfied, click on the “Next” button, if not; modify the data as desired or back up to the previous screen utilizing the “Back” button. The data portrayed in the chart does not affect the source data. When the “Next” button is clicked, the Chart Wizard will ask for chart titles, axis titles and other items for the chart. Some of these items may not be available because of the chart type selected, some may be filled in with information the Chart Wizard “learned” from the data. Enter what you desire and the Wizard will show you a working model of your chart as you build it. Under the “Data Table” tab of the dialog box, if presented, you can select an option to show the source data with the chart. A very nice feature for some data presentations. When satisfied, click the “Next” button and ensure that the chart will be placed on the current sheet, the default selection by the Wizard and click the “Finish” button. The Wizard will finish your chart.

If your chart does not seem large enough – not all of the data is visible, you can drag the chart away from the border of the worksheet. You can also change its size by clicking on the chart and getting “Frame ears” or “handles” to appear on the exterior borders of the chart, then grab one of these frames or handles with the mouse and drag the chart into a larger (or smaller) size. Be aware that the chart consists of many objects and clicking “into” the chart and getting “Frame ears” or “handles” inside the exterior frame means you have grabbed an object in the chart, not the overall chart.

Your chart is finished but since you selected an inappropriate chart presentation for your data, your chart does not clearly portray the information. No problem. Like many things in Excel, your chart is a dynamic, live, object. Right click into the chart and select “Chart Type” from the pop-up menu. You are back into the Chart Wizard and can select a more appropriate chart type and preview it again if desired. By right clicking the chart you can gain access to many of the chart functions, features and capabilities. This includes being able to format fonts. You can also add, remove, and reposition labels. Try clicking on a label, once “Frame ears” or “handles” appear, strike the delete key and the label goes away.

The chart can be copied and pasted elsewhere. The chart is “live” – if the source data changes, the chart changes. Be sure to save your work.

## Go To

With Excel worksheets as large as they are you frequently traverse to various areas via the scroll bars, the “Tab” key, the “Enter” key, or the arrow keys. Excel has a “Go to” function accessed by the keystrokes Ctrl-G (Go to) or through the path Edit > Go to. The pop-up dialog box asks where to? You can enter a cell address such as A4 and click “OK” and you are there. If you have named ranges, as exists on the “Named Ranges” workbook, when you invoke the Ctrl-G (Go to) command, you will be presented with those areas in the dialog box for quick and easy selection. The ability to use “Go To” to move to a cell labeled “NetIncome”, “AdvertisingExpense”, or “GrossSales, (remember named ranges cannot have spaces) is another reason to name a cell or a range of cells within Excel. Obviously, using abbreviations would make the issue easier.

You can use the “Named Ranges” data file to try this capability.

## Keystrokes & Shortcuts

There are many keystrokes that work in a standard Windows format regardless of the program. Some are unique to the program. Here are some simple and useful keystrokes for Excel:

The keystrokes of Ctrl-Home (key / keystrokes not type in entry) will take you to cell A1 unless the upper row(s) or left column(s) frozen through “Freeze Pane”. Then Ctrl-Home will take you to the upper, left most cell not frozen. Ctrl-Home will not take you into frozen columns or rows.

The keystroke of Home will take you to column A of the row with the currently active cell. It will not take you into frozen columns.

Page up will change the screen displayed up one “pane” of cells. If the top row is row 128, page up will make the bottom row on the new screen 127. If there is not enough rows available because of the upper or lower limit of Excel, nothing will happen. It will not take you into frozen rows.

Page down will change the screen displayed down one “pane” of cells. If the bottom row is row 128, page down will make the top row on the new screen 129. If there is not enough rows available because of the upper or lower limit of Excel, nothing will happen.

Arrow keys will move you one cell up, right, down, or left for each striking, if held, they will scroll you in the selected direction. If you have edited the data within a cell, the use of the arrow keys will not let you leave the cell. “Tab” or “Enter” must be struck or you must click into another cell with the mouse.

Ctrl-A selects all cells on the worksheet.

Ctrl-B toggles the selected cell or range of cells into and out of bold text mode.

Ctrl-C copies the selected cell or range of cells.

Ctrl-D is fill down – starting with the source cell, highlight the range you want filled in and press and release Ctrl-D for the fill to occur.

Ctrl-F brings up the “Find” and “Find and Replace” dialog box.



Ctrl-G brings up the “Go to” dialog box.

Ctrl-H brings up the “Find” and “Find and Replace” dialog box.

Ctrl-I toggles the selected cell or range of cells into and out of italics text mode.

Ctrl-K brings up the “Hyper link” dialog box.

Ctrl-N opens a new worksheet.

Ctrl-O brings up the “Open Workbook” dialog box.

Ctrl-P brings up the “Print” dialog box.

Ctrl-R is fill right– starting with the source cell, highlight the range you want filled in and press and release Ctrl-R for the fill to occur.

Ctrl-S saves the file if it has been saved before, it brings up the “Save” dialog box if this is the first save operation.

Ctrl-X is cut the cell or range of cells.

Ctrl-Z is “Undo”.

Ctrl-` - the accent character on usually to the left of the 1/! Key brings up the audit tool bar.

Ctrl-1 (The number one) is format cell or cells.

F1 (The number 1) brings up the Help screen.

F5 is refresh.

F7 starts spell-check.

F12 brings up the “Save As” dialog box.

# CHAPTER 13

## CHAPTER OUTLINE

Macros  
Clear And Cut

Hiding Columns And Rows  
Column And Row Size

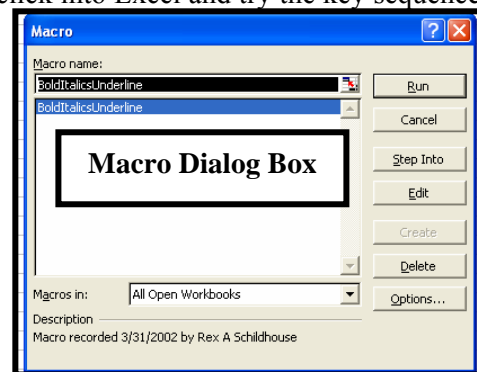
## Macros

Macros are small programs that you can build out of keystroke modeling – you record them by doing what you normally do for later, repetitive, use. When needed you activate the macro and have it do the task for you. To record a macro ensure you know the keystrokes and commands you desire to utilize in the macro. If you record an error in a macro you may have to edit the macro to remove the error or rerecord it. If not corrected, the macro will commit that error every time it is run. However, if the correction is made in the recorded keystrokes, it just consumes time and memory. You will build a simple macro for demonstration purposes that formats the cell to bold, italics, and underline in a single event. Place your cursor into cell A10 of the Macros data file to make that cell the active cell. Bring up the macro dialog box by following the path Tools > Macro > Record New Macro. You will be asked for the name of the new macro and where you would like it stored. The name should not have spaces or special characters in it. Excel will tell you if the title is unacceptable. The demonstration macro, which is on the Macros data file is named BoldItalicsUnderline so try BIU for your macro. In the “Store Macro In” window select “This Workbook”. This will contain the macro to the data file allowing it to move with this Excel workbook. The dialog box asks if you want to assign a control key to the macro – enter the character “m” as a lower case letter without striking any other key. Click on the OK and Excel will commence recording the macro.

**Tip:** To see if a control key is assigned a function in Excel, click into Excel and try the key sequence. If Excel gives you a dull thud response, the key command was not recognized, or it is unavailable at the moment.

Once Excel starts recording the macro, everything you do will be recorded. Click into cell A2 then click the “Bold” icon, the “Italics” icon, and the “Underline” icon on the task bar. Then click on the stop recording button on the macro dialog box the appeared on the screen. This is a square button as shown. When you click the “Stop Recording” button your macro is stored and available for use. If you do not have a stop button showing you can utilize the path Tools > Macro > Stop Recording.

Now click into cell A3 and run the macro through the keystrokes Ctrl-m or through the path Tools > Macro > Macros and click on the “BIU” select and click run. The error with the macro is that it goes to cell A2 and puts bold, italics, and underline on cell A2. This is because the first thing you told the macro to do was go to cell A2. You could have avoided this by being in the target cell at the time you recorded it – this was intentional. Now we will edit the macro to preclude it from moving to cell A2 each time. Follow the path Tools > Macro > Macros, single click BIU, then select “Edit” from the button choices. The macro tools and the Microsoft Visual Basic window will open and you will see the macro command



strings. One of the command strings reads “Range("A2").Select”. Highlight and delete this one line then close the window. You have now edited (corrected) the macro. Click into cell A3 and invoke the macro with the keystrokes Ctrl-m and cell A3 should become bold, italics, and underlined.

Macros are powerful tools. They can be absolutes – go to cell A2 – as we originally recorded BIU. Or they can be focused on the target cell or the active cell as BIU was edited to. Macros will format worksheets, enter data, run spell check, and almost any other repetitive task you have.

You can save the macros you build to the workbook or in a personal macro notebook. If the macro is saved to the personal macro notebook, it may not be available on the workbook if the workbook is distributed or transmitted.

**Clue:** When a workbook contains a macro, there may be a warning about its presence. Unless you know the nature and intent of the macro it may be best to decline the macro’s enablement. You may be able to review the macro’s properties while disabled through the edit function on the macro dialog box.

**Tip:** You can assign a macro to an object. This is addressed elsewhere in “Macros And Objects”.

**Hint:** Macros are usually relational. To ensure that the macro goes where you want it to as the first step try Ctrl-G and select “A1” as the destination. This will ensure that the macro will go to the appropriate cells since the starting point is always cell A1.

## Clear And Cut

To Excel “Clear” and “Cut” are two different commands. The “Clear” command under the path Edit > Clear or on the pop-up menu you are presented with when you right click a cell or range of cells as “Clear Contents” deletes the information from the cell or range of cells without posting it to the clipboard for later use. If you want to recover the information, it may be available through the “Undo” arrows or command.

The “Cut” command is available through the path Edit > Cut, on the pop-up menu you are presented with when you right click a cell or range of cells, or by using the Scissors icon on the tool bar when a cell or range of cells is active or highlighted. The item or items in the cut cell or cells is not moved until you select a target cell or range of cells and paste the cut cells in. “Cut” is a one time pasting event. If you want to paste the cell or range of cells in several locations, cut is not the tool, use copy. However, once pasted from a “Cut” process, the new area is currently highlighted so you can copy it without reselecting it. Formulas moved by “Cut” retain their original references, even if relational, formulas copied and pasted are moved relationally unless the reference values are absolute references in the original cell.

## Hiding Columns And Rows

Excel will allow you to hide a column, columns, a row or rows. The methodology is to highlight the column, columns, row, or rows you want hidden. (For this operation, these areas must be adjacent and continuous.) Then follow the path Edit > Hide from the task bar or right click the highlighted area and select “Hide” from the pop-up menu. Once the cell or cells are hidden you will see that the column identifiers and row numbers do not appear to follow the A, B, C, 1, 2, 3 sequence. As shown on the “Hiding Columns And Rows” data file you can see that columns B, D, and F as well as rows such as 5 and 6 are hidden. If you examine the borderlines between the column identifiers and the row identifiers you will see a slight difference in their presentation if there are hidden columns or rows there. These cells remain active in all formula and will still be active for functions like Go to, Find, and Find and Replace. This technique is excellent for extended calculations that are not

	A	C	E	G	H	I
1	A1	C1	E1	G1	H1	I1
2	A2	C2	E2	G2	H2	I2
3	A3	C3	E3	G3	H3	I3
4	A4	C4	E4	G4	H4	I4
7	A7	C7	E7	G7	H7	I7
8	A8	C8	E8	G8	H8	I8
9	A9	C9	E9	G9	H9	I9

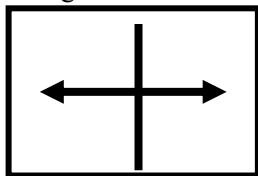
desired in the presentation. However, copy and paste commands are active on these cells and caution needs to be exercised when a cell or cell is hidden.

To unhide a column(s) or row(s) you have several options. Highlight the predecessor through successor columns or rows that border the hidden columns or rows through a sweep operation and follow the path Edit > Unhide from the menu bar or right click the highlighted area and select “Unhide from the pop-up menu. There is also “Hide” and “Unhide” options through Format > Column or Format > Row from the menu bar.

In the “Hiding Columns And Rows” data file there are numerous areas for you to hide and unhide.

## Column And Row Size

The size of the columns and rows can be adjusted within Excel in several manners. The first is to “grab” the right border of a column identifier or the bottom border of a row identifier with the left mouse button



depressed when it becomes a double headed arrow and drag it (or them), or collapse it (or them), to the size you desire by moving the mouse. If you highlight more than one column or row at a time, whether adjacent or not, they will all resize to the same dimension at the same time. Remember that you can select or highlight nonadjacent areas by holding the control key down while clicking the columns or rows with the mouse.

An alternative is to “Autosize” the column or row by placing your cursor over the right border of a column identifier or the bottom border of a row identifier and double clicking it with the left mouse button when the cursor becomes a double headed arrow, as shown. This changes the column or row’s size quickly to the largest item in the column or row. **DO NOT DO THIS ON THE EXERCISE OR PROBLEM TEMPLATES.** Many of the templates have long text strings in them with specific justification and this will cause rapid growth of the worksheet. Another method of sizing a column or row is to highlight the column or row and follow the path Format > Column or Format > Row, as appropriate, and select what action you want. With the “Width” or “Height” option you will be asked to manually enter a value. For a column, the default width is approximately the width of 0123456789, 10.0, in default font. For a row the default height is 12.75. If you resize a column or row to a width wider than the screen or a height greater than the screen, you can resize it through the path Format > Column or Format > Row and select “Width” or “Height” and set to a value of approximately 10 for the column width or 12.75 for the row to return it to near default value.

If you have a column or row highlighted you will also find width and height setting options on the pop-up menu if you right click the highlighted column or row.

There are no hidden columns or rows in the exercise and problem templates but there are merged cells. Merged cells are covered elsewhere in the text.

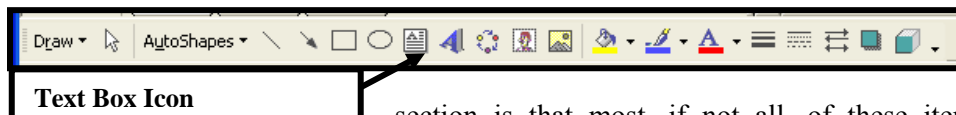
# CHAPTER 14

## CHAPTER OUTLINE

Drawing On Worksheets

Macros On Objects

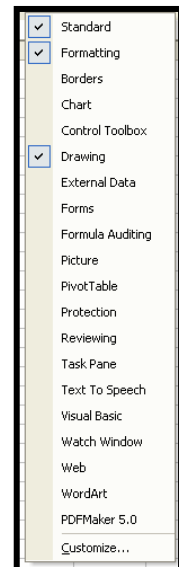
### Drawing On Worksheets



The first and foremost item to remember in this section is that most, if not all, of these items are “on top” of the worksheet. They are not in cells or attached to cells. You can enter data beneath them and around them without a problem. To bring up the Excel “Drawing” tool bar right click on any menu bar and select “Drawing” from the options. On the “Drawing” tool bar, Excel gives you many preformatted and adjustable capabilities as well as some degree of free hand modifications. The “Drawing” tool bar is shown here with the standard or default options. The first item to be addressed is the ability to draw arrows. To draw an arrow, click on the arrow icon and then click on the point where you want the arrow to appear to be coming from. If the point of origin is not visible on the screen after you activate the arrow, use the scroll bars to navigate the worksheet or hit escape two or more times to cancel the “Draw Arrow” command while you reposition the screen. Place your cursor over the point of origin and click and hold down the left mouse button. Now move the mouse cursor to the destination or target, if the target is not visible on the screen move your mouse cursor towards the general direction and Excel will scroll towards it. When you have the mouse cursor at what will be the arrowhead in position, release the left mouse button and the arrow will form. If the “weight” or thickness of the line is other than what you want, while the arrow is still “active” as indicated by empty circles at each end, click into the icon with the numerous different thickness lines on the “Drawing” tool bar and pick your choice. If the texture of the arrow is less than desirable, while the arrow is still active, click into the “Textures” icon, usually next to the “Weight” icon, and pick your choice. You can also right click the object and get a pop-up menu which will give you access to the “Format AutoShape” dialog box. If the arrow is not selected, simply click on it when your mouse cursor is placed over it or immediately around it and the cursor becomes a four-headed arrow icon.

Once the arrow is drawn, place your cursor back on top of it and move the cursor slightly until you get a four headed arrow for a cursor. At the point that the cursor changes, left click the mouse to “grab” the arrow then right click it and a pop-up menu will appear. From this menu select “Edit Points”. With this option active, you can place your cursor on the arrow at any point and bend it around. To flex the arrow, move your cursor over the arrow and when it becomes a “crosshairs” type presentation, left mouse button down and drag it around. The point of origin and the destination will remain the same but the path will change. If the corners are abrupt, place your cursor on a corner, right click the arrow to get the pop-up menu and select “Smooth Points”. At this point on your arrow the corners should be rounded. If you place your cursor over a corner point, shown only while the arrow is in “Edit” mode, you will see a “line handle” appear, grabbing and moving this line handle changes the aspects of the corner. Whether you

The first and foremost item to remember in this



have an arrow or line selected, they work the same; you can change the weight, pattern, and color through the icons on the “Drawing” bar.

There is a text box on the tool bar, it is a white sheet of paper with a letter “A” in the upper left corner and lines making it appear like a newspaper. (Identified in the screen print earlier in the section.) Click and release on this icon and then click into the worksheet and keep holding the left mouse button down. While you are holding the left mouse button down, drag the cursor away from the point of origin to create a text box. At any time, you can drop the text box drag and start to enter text into the box. If the box was created to wrong size, click near the borders to get the handles or ears active, then grab a handle or ear and drag it to a bigger size. To move the box, select the box, then move your cursor near the edge until it becomes a four arrow headed object, while the cursor is a four headed arrow, left mouse button down and drag it to the new location. Just like dragging other objects like arrows and lines. Spell check will check the spelling inside text boxes, just like inside comments. You can fill the box by selecting it and then selecting a “Fill” color. You can change its borders by selecting the box and selecting a line weight and texture from the tool bar while the box is the selected object. Many of the screen prints in this book were done with text boxes and arrows from the drawing tool bar. Additional formatting options are available by right clicking the text box and then selecting “Format Text Box” from the pop-up menu that appears.

There are preformatted rectangles and ovals on the drawing tool bar. Simply click on the icon then click into the worksheet and start to drag them around until you get the shape you want. You can drag them to a new location by moving your cursor near an edge looking for the four headed arrow before left clicking down, just like arrows, lines, and text boxes.

***Hint:*** If you hold the shift key down on the keyboard while creating a rectangle it will remain a square as you resize it. If you hold the shift key down while creating an oval, it will remain a circle while you resize it. Holding the shift key down while drawing lines and arrows will give you straight lines.

To delete an object, select it by clicking on it when the mouse cursor becomes a four headed arrow and hit the “Delete” key. Using the cut command will allow you to paste it somewhere else – once. Using the copy command will allow you to paste it in numerous locations. It can be repositioned by dragging it once placed.

***Hint:*** If you want the object moved from its original location but placed in numerous other locations “cut” it from its original location. The paste it into its next location. While Cut to Paste is a one-time event, the object is still selected by default. Now you can simply copy it with Ctrl-C, Edit > Copy, right clicking it and selecting “Copy” or any of the other copy methods and then move to the next points to paste it repetitively without going back to the very first (original) location to delete it.

An important issue with drawings, images, clip art, and pictures is their positioning within the presentation’s other objects. On the “Drawing” data file is a color JPEG image of a pencil. Click on the pencil to select it. Then right click the pencil. From the pop-up menu select the “Order” option. This establishes where the image will be in relation to other objects. From the options select “Bring to Front” and the pencil will no longer be hidden behind the other objects. Many of your objects within Excel and Word have this option available to them.

On the tool bar and through the path Insert > Picture you can insert pictures and clip art onto the worksheet. This is a great feature to document fixed assets or merchandise for inventory type issues but the file sizes get large very quickly. WordArt is also available for use through the drawing tool bar as well as the path Insert > Picture > WordArt. Inserted here is a scanned image of a pencil. It is saved as a JPEG file and inserted into the text through the same process as it was inserted on the Excel Drawing data file.

Do not miss the opportunity to play with the “Insert Diagram” or the “Organizational Chart” tool.



***Hint:*** These tools can be very effective when used well. It is recommended that you review professional magazines, newspapers, and textbooks to get examples of good presentation techniques. None of the examples in “Drawing” data file would be used in a professional format, they are provided as examples of the power (and the abuse of power) available in Excel.

## Macros On Objects

Once an object is drawn in Excel it is possible to attach a macro to it. By doing this, clicking on the object will activate and run the macro. The “Macros On Objects” worksheet in the “Macros On Objects” data file has the pencil, shown earlier, as an object on it, and a macro is attached to it. Place your mouse cursor over the pencil and the cursor will become a hand. At that point click the left mouse button to activate the macro. You can reset the macro by running another macro which is attached to the “Reset pencil macro” text box.

To accomplish this task, click into the “Macros On Objects Playground” worksheet. As an exercise, draw or place an object on the worksheet. Then record a macro by following the path Tools > Macros > Record Macro as discussed in the “Macros” section. Assign a name such as “ObjectText” to the macro. No shortcut key is necessary. Once the macro starts recording, utilize the Ctrl – G sequence of keystrokes and instruct the “Go To” dialog box to go to cell A1. Now click into a cell below your object and type in a short text string such as “This object works just fine.” and press and release the “Enter” key to complete the text entry. Click back into the chosen cell to make it the active cell. Then highlight the cells about 5 columns across and two or three rows down. While still within the macro, follow the path Format > Cells. Within the “Format Cells” dialog box, on the “Font” tab, select “Script” for a font, then adjust its points or size to “18”. On the “Alignment” tab, select “Merge Cells”, “Wrap Text” and then, set both horizontal and vertical placement factors to “Center” and click “OK”. Now click on the macro recorder stop button or follow the path Tools > Macro > Stop Recording.

The macro is recorded. You can edit it as explained in the “Macros” section if needed. Right click on the object you built or inserted. From the options select “Assign Macros” and the select your macro from the list shown and click “OK”. Then click on your object to see if it works.

The pencil has a macro assigned to it. You can right click the pencil and see which macro is assigned. You can access the macros through the path Tools > Macro > Macros. By selecting the macro assigned to the object, you can read it through the “Edit” button. You can click on the pencil to run its macro. To reset the pencil macro, click on the pencil’s macro reset button. Lower in the “Macros On Objects” worksheet there is a “test” which shows to powers of macros and the convenience of objects as buttons. There is a reset button for the test.

***Hint:*** Macros are usually relational. To ensure that the macro goes where you want it to as the first step try Ctrl-G and select “A1” as the destination. This will ensure that the macro will go to the appropriate cells since the starting point is always cell A1.

# CHAPTER 15

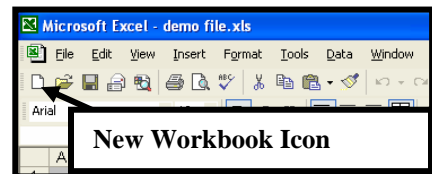
## CHAPTER OUTLINE

Read Only Files And Templates  
Truncate

And  
Or

### **Read Only Files And Templates**

The data file titled “Data Form” with the extension of “XLT” is a special type of Excel file called a “Template”. This type of file has a special property associated with it in that, when opened within the later versions of Excel, it will create a standard Excel file titled “Data Form1” when opened the first time. When opened the second time it will create “Data Form2”. These files can be saved by their default names or can be saved with a new name and in a new location by using the File > Save As path to alter the title and / or path. In some versions of Excel you will receive an advisory screen pop-up that states this is a template and has “read only” properties. In these versions of Excel simply acknowledge the advisory pop-up and follow the path File > Save As to save the file as a new name and, if desired, to a new location.



This feature of read only capability was built into Excel to allow you to build one standard reference and structure file, a template, and be advised that you do not want the core or base file to be populated with data since you will using that structure again with new data. Templates are frequently used for files that are used time and time again with one structure and new data, such as time sheets, travel / expense reports, and job logs.

**Note:** The use of “Exercise and Problems Templates” as provided with this book simply means a standard data file that everyone in the class, course, or program will be using. The data files accompanying this book are not read only and can easily be written over.

### **Truncate**

Truncate reduces the number of significant digits from one calculation to another. Within the “Truncate” data file on the data disk, is a math computation that was accomplished to determine the flight time for each flight by each pilot. This formula took a value such as (Tach In – column E) tachometer (engine) hours of 553.0 as recorded at the completion of the flight and subtracted the (Tach Out – column D) beginning tachometer (engine) hours of 551.4 to determine that Calvin should be charged with 1.6 hours for this flight as shown in cell F2. This same formula is also in column G2. The formulas in column G was then copied and with Paste Special > Values turned into hard numbers. When those hard numbers are looked at, the values don’t make sense. The formula values are 551.4 hours subtracted from 553.0 hours and the results should be 1.6 hours but the answer as shown in Excel to fourteen significant digits is “1.60000000000002”. To avoid passing values that appear this way you can use the “Truncate” formula as written in cell I2, “=TRUNC(G2,1)”. This formula will take the value in cell G2 and reduce it to one significant digit as instructed by the “1” following the cell reference and comma, trimming those extra zeros and that inappropriate “2” from the number. However, this is once again, a formula so it needs to be copied and pasted through Paste Special > Values to eliminate this presentation.



To save the steps, you can use an embedded formula such as shown in column J, “Calc Time 2” to do the job in one process. The embedded formula is “=TRUNC(E2-D2,1)” which truncates the results of subtracting the out time from the in time and reducing or trimming the significant digits to one in a single step. You now need to copy and “Paste Special > Values” only column J to complete the process of eliminating formulas for your worksheet.

The balance of the worksheet in columns I, J, and K are available for your practice.

## And

The “And” function is found under the Logical” category of Excel’s formulas and functions. It can compare up to 30 values against your specified requirements and return a “True”, “False”, numerical, or text string response depending on your requirements. In the “And” data file on the data disk you will find several examples of this formula in operation. In cell D1 the “And” function is being instructed to check cells A1 through A5 to ensure that they are all greater than 2. Since only cells A4 and A5 are greater than 2 (cell A3 is equal to 2), the “And” function returns a “False”. In cell D2 the “And” function is being asked if A1 is equal to 1, if A2 is equal to 2, if A3 is equal to 3, if A4 is equal to 4, and if A5 is equal to 5. Since they are, as supplied on the data disk, the function returns a “True”. Since the “And” function by itself can only return a “True” or a “False” in cell D3 the “And” function is embedded within an “If” statement to return a text string – if all of the cells A1 through A5 are greater than 3, return a “Good”, if they are not all greater than 3, return a “Bad”. The “And” function is providing the “If” statement a “True” or “False” determination. And, since the “If” statement is limited to seven layers of parenthesis while the “And” statement can evaluate thirty values, you have greater latitude in your evaluations.

In cells G10 through G12 the “And” function is being utilized with the “If” statement and the “Concatenate” function to make a determination and return a clean cell or a text string and a value. (This is being done for demonstration purposes as an “If” statement and “Concatenate” function can accomplish this as shown in cells G20 through G22.) The “And” function determines if it is a true statement that counted inventory is equal to or greater than the minimum level located by the “SumIf” formula. If is, the return is the “Null value”, if not, it utilizes the “Concatenate” function to state what has to be ordered and the amount that must be ordered.

The “And” function does not have to see if all numbers or values are greater than a specific value or less than a specific value. You can mix them up as needed. Inside cell D5 the following formula is placed: “=AND(A1=1,A2<>3,A3>=3,A4<=4,A5<>A1)”. This formula asks if cell A1 is equal to 1, if cell A2 is not equal to 3, if cell A3 is equal to or greater than 3, if cell A4 is less than or equal to 4, if cell A5 is not equal to cell A1. If ALL terms are true, the “And” function will return a “True”, if any one or more are false, the “And” function will return a “False” response. The “And” function will also compare text strings as required.

**Tip:** Make sure the question you are asking will provide the answer you need.

## Or

The “Or” function of Excel will return a “True” response if any one or more of up to thirty conditions specified are true. This is shown on the “Or” workbook on the data disk. This data file is a copy of the “And” workbook with the “Or” function rather than the “And” function. Some of the results are the same, some are different. For example, now that the formula in cell D1 is saying if any one or more of the cells A1 through A5 are greater than “2”, return “True”. And, since cells A3 through A5 are all greater than “2”, the “Or” statement is returning the “True” value.

However, cell G14 now has a minor problem in its resulting logic. Since any one of the conditions is true, that is, the number of apples equals or exceeds the minimum inventory level, the statement is

## 72 Solving Problems Using Excel For Windows

returning a “True” to the “If” statement and the “Concatenate” function is telling you to go skiing when in reality you must order berries.

# CHAPTER 16

## CHAPTER OUTLINE

Null Value  
Average & AverageA

Convert  
Text To Columns

## **Null Value Section**

The “Null Value” is a special term – it is not a space as imposed by pressing and releasing the space bar, it is not a letter or character such as a, b, or c, it is not a number such as 1, 2, or 3, nor is it a punctuation mark or symbol such as !, ?, @, or #. It is the double quote symbol followed immediately by the double quote symbol such as “” without anything separating them. The best way to define the “Null Value” is it is nothing and it is not anything else. It is used frequently within formulas to return a “clean and clear” presentation. On the “Null Value” data file the use of the Null value is demonstrated. The worksheet is defaulted to show “0” values through the path Tools > Options > View and then ensuring that there is a full color (not faded or blank) checkmark is within the “Zeros Values” box near the bottom of the screen. This is also the default setting for most of the exercise and problem templates. This option or selection will provide you with the presentation of:

	Sales:	\$100
	Less: Cost of goods sold:	<u>\$100</u>
	Gross profit:	<u><u>\$0</u></u>
Vice:		
	Sales:	\$100
	Less: Cost of goods sold:	<u>\$100</u>
	Gross profit:	<u><u>          </u></u>

In the first example it is clear that the value being presented is “0”, in the second example it is not clear if the formula has even been entered.

The null value is frequently used in if statements as a response. In the “Null Value” data file, the worksheet determines and presents appropriate periods for depreciation. In cell B4 you enter the life of the asset in years. In cell B5 you enter the periodicity of depreciation – annual, semi-annual, quarterly, or monthly. The formulas in columns B and E starting on row 12 to determine if the period is applicable and enter a period number or return the null value, as instructed through cells B4 and B5. Based on the availability of depreciation periods, the concatenate formula in column C returns a text string or the null value while column F returns choice of text strings. As you scroll down the columns to see the difference, where the periods are not available in the null value column, the columns are blank and appear to be empty. In the “zero value” column, the response of non-available periods is “0”, an unnecessary and cluttered display and an unnecessary text string.

Assume that the “ ” (space) is utilized instead of the null value or a 0. Almost the same thing will happen. The appearance will be clean and crisp as shown in columns H and I. However, now Copy > Paste Special > Values all three examples and you will find the difference. Inside the rows that are not relevant to the “Null Value” columns, there is nothing – the value the if statements were returning was “” – Null – nothing. Inside the rows of the Zero Value columns there are a number of zeros since the if

statements were returning zeros. Inside the space columns are a lot of cells with a bunch of spaces in them. Each unnecessary zero and space adding size to your file.

**Tip:** These issues affect default page size in printing.

## Average & AverageA

Within Excel there are two “Average” functions under the “Statistical” category. The first is “Average” and returns a simple average of an identified range. This formula is shown in operation on the “Average” data file on the data disk. The function written in cell E2 determines the average number of the category “Apple” – cell B2. Cell E3 determines the average number of “Apples”, a range from cell B3 through B11. The formula in cell E4 determines the average number of “Berries”, a range from cell B12 through B23 while the formula in cell E5 determines the average number of “Cherries” in a range from cell B24 through 33. This formula is simply written as “=AVERAGE(Range)”. The range can be a continuous string of cells in a column or row or can be a range of cells such as columns and rows such as the formula shown in the range of F10 through M31. Average will not count text strings into its averages.

The second formula is “AverageA”. With this formula you can even account for text strings in your average such as “True” – a value of 1, “False” – a value of 0, while the occurrences of text strings such as “N/A” get counted in the denominator of the average equitation but there is no value for them in the numerator of the equitation. This is a handy tool for the average number of correct answers on a “True/False” question as shown in column O of the “AverageA” worksheet.

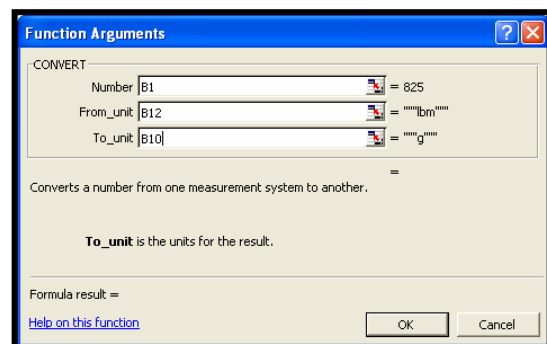
## Convert

The “Convert” function will accept one value and then convert that value from one measuring standard to another measuring standard. Tired of trying to remember that 2.2 pounds is roughly 1 kilogram and have to convert 825 pounds to kilograms for an shipping invoice? Try the “=SUM(CONVERT(825, "lbm", "g")/1000”. One of the requirements for this function to work is that the “Unit Id” must be in double quotation marks and in the proper case – some upper case, some lower case. For example, while Excel ignores “=CONVERT(”, “=Convert(”, “=convert(” upper or lower case issues, it will “fault out” if the formula is written as “=CONVERT(825, “LBM”,g)” since it will not recognize the unit ID of upper case “LBM” because of the upper case issue. Nor will it recognize the lower “g” without the double quotation marks.

Utilize the “Help” screen for “Convert Worksheet Function” from Microsoft Excel for more units and information. This table is a brief listing of the values that Excel can convert from and into:

Unit Id:	Unit Title:	Unit Id:	Unit Title:
<b>Weight:</b>			
"g"	Gram	"C"	Degree Celsius
"lbm"	Pound mass (avoirdupois)	"F"	Degree Fahrenheit
"ozm"	Ounce mass (avoirdupois)	"K"	Degree Kelvin
<b>Distance:</b>			
"ft"	Foot	<b>Liquid Measurement:</b>	
"in"	Inch	"cup"	Cup
"m"	Meter	"gal"	Gallon
"mi"	Statute mile	"l"	Liter
"Nmi"	Nautical mile	"oz"	Fluid ounce
"yd"	Yard	"pt"	U.S. pint
<b>Time:</b>			
"day"	Day	"qt"	Quart
"hr"	Hour	"tbs"	Tablespoon
"mn"	Minute	"tsp"	Teaspoon
"sec"	Second		
"yr"	Year		

On the “Convert” data file there is a data matrix of common convert terms or “Unit Ids”. The values within column B cannot be utilized as “Look to” values since they are in quotation marks, the way you are required to type them into Excel. However, the column is duplicated in column C without quotation marks. This allows you to write a formula such as “=CONVERT(B1,C11,C10)” in cell C1 to convert the value of 825 contained in cell B1 from pounds as identified through the value contained in cell C11, to grams through the value contained in cell C10. Had you utilized the column B values of the “Convert” data file for these references you would get a fault indication such as “#N/A” or “#Name”. By looking at the dialog box you would see that Excel is interpreting the formula as “=CONVERT(B1, ““B12””, ““B10””)” which contains too many double quotation marks around the values – so the double quotes are removed from column C for your ease of use.



## Text To Columns

The “Text To Columns” function is found through the path Data > Text to Columns from the menu bar. Through this tool you can “unassembled” text strings such as those that were built by “Concatenate” in the “Concatenate” workbook. Open the “Text To Columns” workbook on the data disk. Much of the data is copied from the “Concatenate” workbook to demonstrate how “Text to column” works. Column A contains a copy of the data in column B. This will allow you work with column B and then copy column A to column B later if you want more practice. Click into cell B1 to make B1 the active cell. Follow the path Data > Text to Columns and you will be presented with the Text to Columns dialog box. The first

choices you are presented with is “Delimited” or “Fixed Width”. Delimited means that your data can be dissected or cut apart by some specific character or event such as a space, a comma, a tab, or other, identifiable character. Fixed width means that your columns will be 1, 2, 3, or as you state, wide to accept the data. And each column can be set to a different width. You can select more than one row and accomplish the process on a range.

For the data in cell B1, a pure text string with spaces between each word and words of inconsistent length, select “Delimited” and click on the “Next” button. The next dialog box will ask that the delimiting values be defined. To do this, ensure that all checkmarks are removed from the dialog box except for the checkmark for “space”. The checkmark in “Treat consecutive delimiters as one” means that if two spaces are found next to each other, they will be treated as if they were single space. This is handy and important as Excel is going to remove the delimiter in accomplishing this process. In this example, the spaces separating the words will “disappear” from the text as it is processed. At this point “Text to Columns” will give you a preview of the possible results. To advance to the next step, click on “Next”. At this point you are offered additional options – you can select a column by clicking on it and format that column in the import process to a limited number of specific formats such as general, text, or date, or you can select not to import the column at all. You can also change the starting point of the “dissection process” on this screen. If you choose a cell other than the origin cell, B2, the data will be left in B2 and “dissected” into the cell in you specify and to the cells to the right of that cell. If the process is going to overwrite existing data contained within those cells, Excel may provide you with a warning but relying on this degree of data protection is risky policy. The result of clicking on the “Finish” button is that the sentence is “dissected” into individual words placed in cells to the right and the spaces that had previously separated those words have been removed.

Click into cell B5. This is an address cell that contains two delimiters that you want removed from the text in the process. They are the comma and the space. Follow the path Data > Text to Columns and select “Delimiters” and next. This time ensure that the space and comma are checkmarked and then click “Next” or “Finish”. If you clicked “Next” you will have to click “Finish” to complete the process. This time the data has been dissected into neat, clean cells for later processing.

Click into cell B21. Analyze this cell for delimiters and the logical choices are commas and colons. The use of spaces as a delimiting value will break apart the alpha numbers and descriptions. While this may leave the cost issue together, you can run another “Text to Columns” process on the cell that contains those values later.

The fixed width option can be used to dissect one or more cells, just like the delimited option. Fixed width will work on text and numerical values just like delimited. Click into cell B31, which contains a numerical value. These values are summed in row 35 to prove they are numerical values. Follow the path Data > Text to Columns and select “Fixed Width” from the options and then click “Next”. In the resulting dialog box you see the whole number since it is not apparent to Excel how this number should be dissected. Place your cursor between the “2” and the “3” and click once to insert a “dividing” line. Click into the space between the “3” and the “4” to insert a “dividing” line. Since the goal is to dissect the whole number into two number groups, this line is placed incorrectly. Click the line once and hold the left mouse button down and drag the “dividing line to the right between the “4” and the “5”. Click between the “5” and the “6”. Again, bad placement. Double click the bad line and it will be removed. Continue to place lines so that the number is dissected into two number groupings. Once complete, click “Next”. From the new dialog box you can change the formatting of the columns and select columns not to be imported through the process if required or desired. You can also select a new starting point for the dissected data to be placed. Remember that if you choose a cell other than the origin cell, the data will remain in the origin cell for later use. Click on “Finish” to complete the process.

# CHAPTER 17

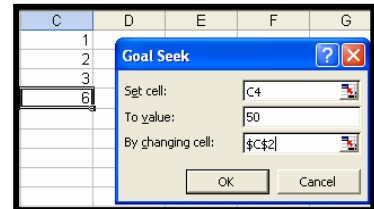
## CHAPTER OUTLINE

Goal Seek  
Indenting Within A Cell

Formula Auditing  
Find

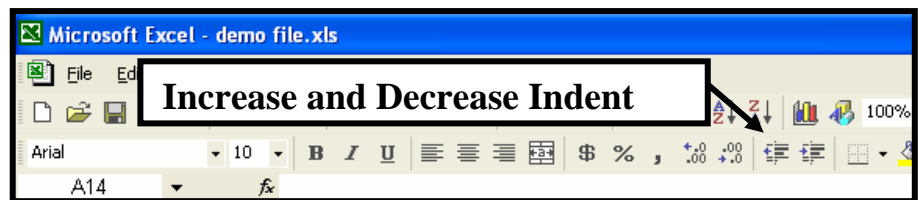
### Goal Seek

Goal Seek is a tool within Excel that will provide you the question if you know the answer. With Goal Seek, click into a cell containing a formula then follow the path Tools > Goal Seek and respond to the dialog box. The worksheet in the screen print is in the Goal Seek data file. The path is Tools > Goal Seek. The pop-up dialog box requires that you identify a cell with a formula in it, for the example that cell is C4. Then enter the value you want the formula to end up at, 50 as shown in the screen print. Then tell Goal Seek what cell you want the value inserted into to create the answer of 50. The cell identified as “By Changing Cell” must be referenced in the formula contained in cell C4. For the example cell C2 was chosen. When OK is clicked with the mouse or the enter key is struck, Excel will produce a pop-up text box stating that it found a solution to get the value of 20 and that that value is 47 and it asks if this answer is acceptable. Since it is, click on the OK and Excel will modify the value in cell C2 to 47 and close the dialog box. If the answer is unacceptable hit Cancel and the value in cell C2 will be left at 1. If Excel cannot compute the value it will error or fault out and tell you it cannot find a solution. This is usually because cell identified in the “By Changing Cell” window is not referenced within the formula contained within the “Set Cell” cell.



### Indent Within A Cell

To indent within a cell without using spaces use the Indent icon on the tool bar. Each click on the icon moves the start of text and numerical data about 2 spaces. Remember that by default text is left justified and numerical data is right justified. Asking Excel to indent numerical data to the right in a default formatted cell may result in an interesting move. The Indent Within A Cell data file is available for you to check the operation of the Increase and Decrease Indent buttons. Column A is default justified left because it contains text. Column B is specifically formatted as right justified even though it contains text. Column D is specifically left justified even though it contains numerical data while column E is default right justified as numeral data. Click into various cells in these columns and click on various combinations of the Increase and Decrease Indent buttons and watch the Excel response.



**Hint:** Excel will indent a cell that contains a formula looking to another cell or computing a value.

The exercise and problem templates provided on the data disk are set up to have the “Look to” formula or function such as “=F12” used extensively to save keystrokes and reduce errors. However, how

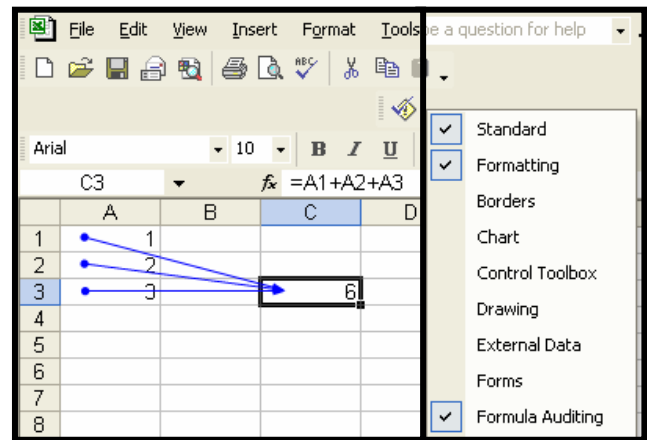
do you handle journal entries with a “Look to” reference? On the “Indent Within A Cell” data file in rows 2 through 5 of column H is a mini chart of accounts. The task is to purchase \$800 in supplies for cash and make the journal entry in cells H8 and H9 with the values in columns M and N. Utilizing the “Look to” formula of =H4 in cell H8 you get the presentation of “Supplies” as the debit. In cell H9 you enter =H2 for Cash but it is flush with the left side of the cell while as a credit account it should be indented. Click on the Increase Indent button and it is. Now enter the value of \$800 in cell M8 and have N8 look to cell M8 to ensure that the cells are always the same.

Now, starting at row 14, purchase \$1,000 in supplies by paying cash of \$250 and the balance on account. Utilize Increase Indent to get the proper presentation of credit entries and formulas to have the cash paid subtracted from the total purchase for the value on account.

Many of the cells within the exercises and problems supplied on the data disk have indent functions imposed on them in their construction for proper presentation.

## Formula Auditing

Excel as a very useful aid for assisting you with the checks of your formulas and logic. The “Formula Auditing” function is controlled through the “Formula Auditing” tool bar or menu. To display this tool bar, right click on the menu bars at the top of the Excel screen, from the pop-up menu select the “Formula Auditing” option from the lists. When this tool bar appears place and hold your cursor over the various icons and Windows will display the function of the icon. The icons of primary interest are “Trace Precedents” and “Trace Dependent”. Click into cell C3 of the “Formula Auditing” data file on the data disk to make cell C3 the active cell. Then click on the icon for “Trace Precedents” and Excel will display arrows from all of the cells that feed this cell data. This is shown on the screen print. If the source cell is a formula, Excel will not “trace through” to that cell’s source. To be effective, the “Trace Precedents” must be activated from a cell with a formula that references at least one other cell. To remove the audit arrows you can click the eraser on the tool bar and all audit arrows will disappear, regardless of where your active cell is. To make only one cell’s audit arrows disappear, click into that cell and click the icon with the negative signs for the action – dependent or precedent.



Click into cell A1. While cell A1 is the active cell, click on the “Trace Dependent” icon on the “Formula Auditing” tool bar. A single arrow will appear from cell A1 to cell C3 showing that the data flow is from cell A1 to cell C3. To see that cell A3 is also a source cell for cell C3 you can either click into cell A3 and click onto the “Trace Dependent” icon or click into cell C3 and click on the “Trace Precedents” icon. Once again, the trace icons with negative signs make individual arrows go away, the eraser on the tool bar makes them all go way. Try this tool on some of the workbooks and worksheets provided on the data disk if the logic or flow of data is confusing.

You can also access the “Formula Auditing” tools through the path Tools > Formula Auditing from the main menu bar. With this path you can select a single event or elect to display the tool bar.



## Find

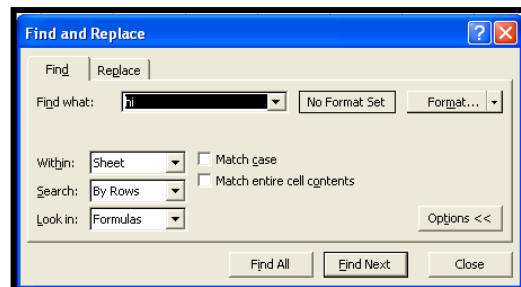
With Excel worksheets, being as large as they can be and the display screen as small as it is, it is often hard to find a specific item quickly. Particularly if a prankster has hidden it by changing its font to white on a white background filled cell. There are four hidden text strings on the “Find” workbook on the data file. Two cells have the value “Hi!!!!” and two cells have the value “You found it!!!!” in them. By using the keystrokes Ctrl-F for “Find” or following the path Edit > Find you will be given the Excel “Find” dialog box. In the “Find What” window of the dialog box enter “Hi” – without the quotation marks. You do not have to put any “!” (exclamation points) but if you do, do not put more than four. When “Find Now” or “Find All” is clicked, Excel will initiate the search and find one of the two strings. The cell that Excel locates will contain no visible text since the text coloring and the cell background are both white. However, in the formula window you will read “Hi!!!!”.

At this point, close the dialog box. When the dialog box is closed, look at the borders of the cell just below the cell that contains the “Hi!!!!”. Something is causing the right side of that cell not to display properly. By clicking into the cell you will find the first of the “You found it!!!!” text strings. Click into a cell 3~5 cells above and to the left these two cells and then highlight the cells down and to the right for about 15 rows and 15 columns. You will see the text strings appear in the blue highlight as white text.

**Hint:** Looking for something hidden and do not know where it is? Try highlighting the cells. Excel will tell you about how much of the worksheet has been used by the scroll bars. The more the scroll bars can move, the larger the worksheet data range. In the data file there appears to be no reason for such “long” scroll bars.

**Tip:** If a range of cells is highlighted when the “Find” function is activated, it will only search those cells. Excel will frequently ask if you want to search the rest of the worksheet but there are instances where you do not get that advisory because you closed the function prior to the function completing the find on the selected cells.

You can also specify conditions or parameters on the “Find” function through the “Options” button near the bottom right of the dialog box. The options include searching the entire workbook from that worksheet and instructing Excel to search in a vertical – by columns, or horizontal – by rows routing. You can also specify if the search is case sensitive or if you are only interested in cells that contain all and only the input you have instructed. If you select “Case Sensitive” and “Match Entire Cell Contents”, the “Find What” of “Apple” will not return “apple”, “apples” or “Apples”. Through the “Format” options you can find italics text only, left or right justified text and other formatting conditions. Remove any text from the “Find What” window for this as it will find only that text with that format if entered and you want to find the format, not text. On the “Find” worksheet there are some formatted cells. Try a search for cells formatted to “Times New Roman”. They may or may not contain text.



## Conditional Formatting

Excel will accept several levels of formatting for a cell under the path of Format > Conditional Format. On the Conditional Formatting data file there is an example in cell A1. If the value is less than 1 the cell appears normal, if the cell contains a value between one and ten, the formatting is horrible, if the value is greater than 10 the formatting gets worse. While this was done for effect, if you were inputting mark-ups

for retail and wanted no percentage less than 50% nor more than 150%, you could format the cell to go red if the percentage is not within this range as cell A3 is formatted to.

By examining the drop-down menu selection choices of the operator, defaulted to “between” you will see that you have a wide range of operators to work with. You can impose up to three levels of conditional formatting on a cell by clicking on the Add button at the bottom of the dialog box. If you have imposed conditional formatting on a cell you can remove one or more levels of formatting by following the path Format > Conditional Format while the target cell is selected and clicking delete on which level of formatting you want removed.

## Pivot Tables

A pivot table is the presentation of data with multiple classifications such as district, salesman, and quantity of various items sold into a logical matrix. The Pivot Tables data file contains a data matrix for the construction of a pivot table. One of the requirements of a pivot table is that you must have two layers of classification on the left side, at least one layer of classification on the top, and data at the intersections of the classifications. This data need not be presorted or arranged, the Pivot Table Wizard will handle that for you. For the example column A is region – North, South, East, or West, column B contains the salesman’s name, row 1 contains the items sold, and the data for each region is contained in the matrix defined by the cells C2 through I32.

As with the Chart Wizard, it is handier to highlight the information before you start the Pivot Table Wizard. So, highlight the range from A1 through I32. This will incorporate labels, titles, and data. Then follow the path Tools > Pivot Table and Pivot Table Chart Reports.... The Wizard’s dialog box will appear asking you what you would like to accomplish and where is the data. Ensure that you are using Excel data in the upper selection and that a Pivot Table is selected in the lower portion of the dialog box, then click “Next”. The Pivot Table Wizard should present you with a confirmation that you are using the range A1 through I32 for the data, confirm this and click “Next”. The next dialog box asks “Where do you want the table to appear?”, select on a new worksheet and click Finish. Excel presents you with a blank table that is used to build the table itself. From the Pivot table field list drag the “Region” item to the top of the pivot table where it says “Drop column fields here”, then drag the “Salesman” item to the area where it says “Drop row fields here”, then drag each of the sales items into the center grid where it says “Drop data items here”. As you drop your items on the table Excel will start working. As you drop each item, the item will change go bold print in the list to indicate that it has been used.

The resulting table will show you who is selling what items where as well as the totals sold for the item and the totals sold in each region. Through the use of the filters, activated through the drop down arrows on the titles, you can control what is displayed. Pivot tables are memory intensive events for the computer. If you are limited as to the number for fields or it takes more than a couple of seconds to generate this table that can be expected.

# CHAPTER 18

## MICROSOFT EXCEL AND WORD

### CHAPTER OUTLINE

Word Tables  
Word Table Formulas

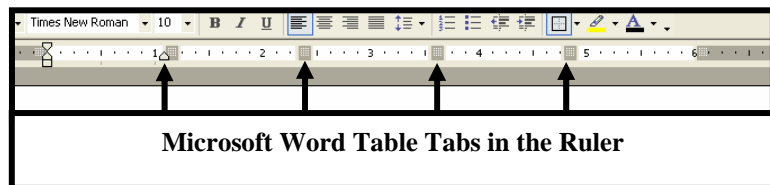
Excel Tables Into Word

### **Word Tables**

Word has the ability to generate basic tables on its own through the path Table > Insert. The table inserted below was created with this function. While it does not have all of the features of Excel, it is a good tool for the presentation of limited material or materials not found elsewhere and not necessarily needed later. By following the path Table > Insert > Table and telling Word through the dialog box that you want a table with 5 rows and 5 columns the result is:

1/A	B	C	D	E
2	10	15	20	25
3	11	22	33	44
4	12	144	1728	20736
5	33	60.33		

By default, Word will make these columns fill the width of the page. You can select the table by clicking into the table and then moving your cursor to the upper left corner area. While moving your cursor in that area, you will see a four-headed arrow appear. Click on that arrow and you will have selected the entire table. You can also sweep and highlight the table from one corner to another if desired. When the table is selected, you will activate the tab markers in the ruler/measurement bars at the top and side of the page. By moving these tab markers with your cursor (select them by left mouse click and hold the left button down) you can change the column width and row height by dragging them. You can also change row height and column width by selecting the row(s) or column(s) by highlighting them, then right



clicking on the highlighted cells and following the path to Table Properties and selecting the Row or Column tabs and changing the values there.

The borders on the table can be formatted by highlighting the specific cell, cells, or the entire table and using the Borders icon on the task bar or right clicking and selecting Borders and Shading. The borders of row 3 have been removed through this process and the double lines under row 5 were placed there by the same process. Under this tab, the line weight and characteristics can be modified as desired to include dashes, dots, and mixes of other symbols. Row 2 was modified in this manner.

The background and text coloring of the cells and their data are controlled as other formatting features that are in Word. You can select the table, the row, the column, or the cell and invoke the colors and features through the task bar icons or by following the path Format > Font while the cells are highlighted.

Once a table has been inserted you can select a row or column and follow the path Tables > Insert and increase the number of rows or columns as needed by instructing Word to place the inserted rows or columns into the existing table above, below, to the right, or to the left of the cursor placement. To insert a specific number of rows or columns, select/highlight that number of rows or columns and then follow the path Table > Insert and select rows or columns from the selection options and inform Word if you want them above, below, to the left, or to the right of the highlighted cells. Rows and columns can be deleted through the path Table > Delete after the row(s) or column(s) are highlighted.

**Tip:** The entire row or column need not be selected to insert or delete rows or columns, only cells representing the number of rows or columns you desire to have Word insert or delete. However, the technique / habit of highlight all of the cells reinforces what will be inserted or deleted before the action is invoked.

## Word Table Formulas

Microsoft Word tables have their own formulas under the path Table > Formulas. It is through this path that you establish and modify formulas within Word tables. Formulas in Word are not “read” in a formula or data entry window like Excel. Word table formulas are done similar to Excel formulas in that they use cell references of columns and rows. The upper left most cell is cell A1, the cell to its right is B1, the cell below cell A1 is A2 and so on. In a Word table though the formula to add the contents of cells B2, B3, and B4 is “=SUM(b2,b3,b4)” and the formula to multiply the contents of cells C2, C3, and C4 is =PRODUCT(d2,d3,d4). Notice that the operation is controlled by the leader – Sum or Product and that the cell references are separated by commas, not attached to each other by math operatives such as the + or \* symbols. The following table contains the formula =SUM(b2,b3,b4) in cell B5 and it adds the rows 2 through 4 into cell B5, the formula =AVERAGE(c2,c3,c4) in cell C5 and it calculates the average of the values within cells C2, C3, and C4 into cell C5, and the formula =PRODUCT(d2,d3,d4) in cell D5 which multiplies the value in cell D2 by the value in cell D3 and the product of that operation by the value in cell D4 and places the final product in cell D5.

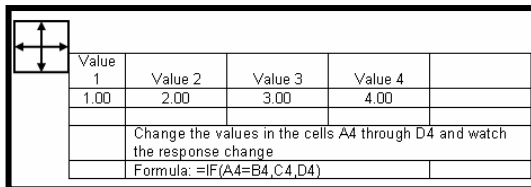
A1	B1	C1	D1
A2	2	3	4
A3	3	4	5
A4	4	5	6
A5	9	4	120
A6	Sum	Average	Product

Word formulas are not “live” like Excel when manual calculation is not invoked. That is, if you had access to this table and changed the value in cell B2 from 2 to 20, the value shown in cell B5 would not change.

**Note:** It is frequently easier to create the table within Excel and then copy and paste it into Word.

## Excel Tables Into Word

While Excel may be a major tool for accountants, communication of information is the key to success. Once an Excel worksheet is populated with data its presentation can be adjusted through hidden columns and rows, paste special, and other tools such as “look to” formulas from a specific area of the worksheet or a new worksheet to give clean presentation. However, this may not suit the complete requirement and the constraints of Excel may hinder the presentation. Much of the work presented within this text was accomplished by entering the data, such as an exercise or problem, into Excel, then highlighting the data, copying it through the keystrokes Ctrl-C, clicking the copy icon on the task bar, or following the path Edit



Value 1	Value 2	Value 3	Value 4
1.00	2.00	3.00	4.00

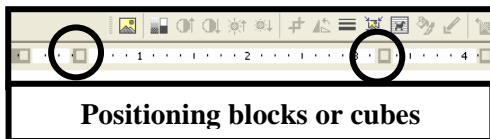
Change the values in the cells A4 through D4 and watch the response change

Formula: =IF(A4=B4,C4,D4)

> Copy. Then the data is pasted into Microsoft Word by selecting Word, placing the cursor into the appropriate area, the target zone, and using the keystrokes Ctrl-V, clicking the paste icon on the task bar, or following the path Edit > Paste. Once placed in this manner, the data is “static” in nature. If the source within Excel changes, the

data within Word will retain its original value without update.

From this point, the data is normally contained within a table which can be formatted as many other Word objects can be with borders, fill colors, fonts and sizing. To move this inserted object place your



cursor near the top of the table and a square with a four headed arrow, as shown in the screen print will appear. When it does, click on it and the table will be selected. While the table is selected, it will highlight to emphasize the fact that it is selected. By right clicking on the

highlighted table, you will be presented with a pop-up menu which has formatting options on it. While it is highlighted, you will see a new set of “blocks” or “cubes” appear in the ruler bar of Word. These blocks or cubes, as shown in the screen print, are the margin tools for the table. You can justify the table by clicking on the Word left, right, center, or fill justify buttons. You can also reposition and resize the table by dragging these margin tools left or right with your mouse.

Additionally, Excel and Word have the ability to paste the data as “linked” information from Excel into Word. With this feature, when the source data in Excel is updated, the Word data will be updated upon the next opening of the file Word file. This feature makes your data dynamic. Word of caution, while being a “really neat” feature, it may not be appropriate for all situations so its use needs to be appropriate. To link the data in Word back to the source in Excel, copy the data as previously explained from Excel, open Word and locate the target area within Word and follow the path Edit > Paste Special, then select Paste Link from the left side of the pop-up dialog box and select Microsoft Excel Worksheet Object in the “As” window. The data, as copied, is pasted into the document and linked back to its parent or source.

Reading the information below it becomes immediately apparent that its presentation is unclear and does not convey the complete data as words are chopped and lost.

Shares  
 40,000 pur  
 par value  
 \$1 p  
 Amount  
 \$50,000 co  
 rate per  
 \$125 flig

If the cells in Excel’s source data are reformatted to increase their width, the “trimming” problem is resolved. But this may not be practical as resizing cells would affect the rest of the parent or source worksheet presentation. This trimming is because the cells are shown as they are in Excel and numerous

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empty cells were copied and pasted, that is, while all of the data has been entered into the cells, the data exceeded the cell width of the column and the Word page and flowed into the areas of other columns. By copying and pasting the link with a smaller range of cells, the presentation is:

40,000	shares purchased
\$1	par value per share
\$50,000	amount contributed to RAS, Inc for the shares
\$125	rate per flight hour flown

Once pasted through the linking operation you can select the data in Word and add additional formatting to it as mentioned earlier without it affecting the source data but that capability is limited. Fill, borders, and font coloring from the task bar are the easiest to invoke. This is done below.

40,000	shares purchased
\$1	par value per share
\$50,000	amount contributed to RAS, Inc for the shares
\$125	rate per flight hour flown

The copied and linked blocks can be moved around once placed by selecting the matrix of linked cells and then moving the tab markers on the index markers.

# CHAPTER 19

## HEWLETT-PACKARD HP-12C

### CHAPTER OUTLINE

Hewlett-Packard HP-12C Basics  
Days Between Dates With The HP-12C  
Storing Values In The HP-12C  
Balloon Payments With the HP-12C  
Time Value Of Money With the HP-12C  
Present Value Of A \$1 With The HP-12C

Future Value Of A \$1 With The HP-12C  
Present Value Of An Annuity Of A \$1 With The HP-12C  
Future Value Of An Annuity Of A \$1 With The HP-12C

### **Hewlett-Packard HP-12C Basics**

Hewlett-Packard produces the HP-12C Programmable Financial Calculator, a calculator for the professional accountant, financial analysts, and business users. This calculator uses “RPN” or “Reverse Polish Notation” logic. With this logic as an operating system to add 2 and 2 together and get the result of 4, the keystrokes are:

“2” – The display shows “2”.

“Enter” – The display shows 2.0000. (If the display is set to 4 significant digits.)

“2” – The display shows “2”.

“Plus” – The display shows 4.000. (If the display is set to 4 significant digits.)

This is slightly different than the

“2” – The display shows “2”.

“+” – The display shows 2.0000. (If the display is set to 4 significant digits.)

“2” – The display shows “2”.

“=” – The display shows 4.000. (If the display is set to 4 significant digits.)

of calculators like the BA II+ of Texas Instruments. When mastered, the HP-12C can greatly assist you in your academic endeavors, accounting, financial, and business career. The HP-12C has an extensive manual and many features, only a few will be addressed here. The same basic features will be addressed for the Texas Instrument BA II+ (Business Analyst II+) in other chapters.

**Hint:** There is no “=” (equal sign) on the HP-12C calculator.

First, the HP-12C default for significant digits displayed is four shown as “0.0000”. In most academic, accounting, financial, and business situations four or five significant digits are appropriate. And, when the requirement is less, the few extra digits displayed can easily be ignored. They will also be hidden if the HP-12C needs more display room for whole numbers. To set or change the number of decimal places displayed in the HP-12C’s display follow these steps:

1. Turn the HP-12C on by pressing and releasing the black “ON” button on the lower left corner of the key pad. This is a “toggle” switch, pressing it while the HP-12C is on will turn the calculator off.

2. Press and release the yellow “F” (Function) key once. This key is just to the right of the “ON” on the bottom row.

3. Press and release any of the numerical numbers from “0” through “9”. The display changes to the requested display immediately. Any values current in the display are redisplayed in the new format.

4. Now test the calculator, if you chose “4” as the significant digits, dividing 0.025 by 30 is actually 0.000833333.... This is done by the keystrokes “0.025”, “ENTER”, “30”, “÷” and the display should show “0.0008” when the HP-12C is asked for this calculation while set to four significant digits. The trailing 3s round down and therefore, “off” the display. This complete value to some significant number of digits is still held in memory, without rounding, for future calculations. Multiply the display by 100,000 through the keystrokes “100000” and then “X” (Multiply) and the results should be “83.3333” – demonstrating that the non-displayed values are not lost.

8. Now divide 0.025 by 26 with the keystrokes “0.025”, “ENTER”, “26”, “÷” and the display should show “0.0010” when the HP-12C is asked for this calculation while set to four significant digits. The HP-12C should return “0.0010” while the actual value is 0.00096154... and it has been rounded up to 0.0010. Multiply the display by 100,000 through the keystrokes “100000” and then “X” (Multiply) and the result should be 96.1538 – again demonstrating that the non-displayed values are not lost.

Second, the HP-12C gives you a quick way to support the time value of money calculations in numerous periodicities as well as annual statements and monthly interest and payments. No adjustments or setting need be made. These will be discussed in detail later.

**Tip:** When using the time value of money function on the calculator develop the habit of entering values in all “fields” from left to right or right to left even if that value is “0” (zero). This should preclude any old values from entering the equation unexpectedly.

Enter the following data through the keystrokes – enter “60” in the “n” field of the time value of money register of the HP-12C by typing in “60” into the display and pressing and releasing the “n” key in the upper left corner of the HP-12C. Pressing the “ENTER” key is not required since you will not be using it for a “keyboard” operation. Type in “6.9” and press and release the “ENTER” key, the type in “12” followed by the “÷” (Division) key. The display should read “0.5750”. Press and release the “i” (Interest) key to record this value as the period interest. Type in “35000” and press the “PV” (Present value) key to enter the loan value into the present value field. Type in “0” and press and release the “PMT” (Payment) field. As a matter of discipline, entering a value, even “0” in the fields or register from left to right or from left to right will preclude an unintended value from entering the calculation. Type in “0” and press and release the “FV” (Future value) field. Now press the “PMT” key and the HP-12C will calculate the payment for the loan as “-691.3918”.

The HP-12C will respect the presentation of cash flow and value flow within the time value of money (TVM) calculations. If the “PV” (Present value or principle value) is entered as a positive number indicating cash flows in or value flows in, the “PMT” (Payment) and / or “FV” (Future value) will be negative indicating cash flows out or value flows out. If “PMT” (Payment) is entered as a positive value indicating cash flows in or value flows in, then computed “PV” and / or “FV” (Future value) will be negative indicating cash or value flows in the opposite direction - out. If you wanted true discipline, you can enter the present value as positive since it was value inflow to you and cash outflow in payments will be negative. However, if you were the used car salesman and wanted discipline, in the data enter, type in “35000” and then press the “CHS” (Change sign) key in the fifth column of the first row. This will convert a positive display to a negative value (or a negative value to a positive value). Rerun the calculation simply by placing a “-35000” (negative) into the present value field and recompute the payment. This time the HP-12C should show “691.3918”, a positive value indicating cash flows or value flows in since the present value is negative, representing cash flows or value flows out.



Annuities can be paid at the beginning or the end of the payment period. To make this change there are two buttons on the HP-12C. The “Beginning” button labeled “BEG” in blue font on the slanted face of the “7” and the “End” button labeled “END” in blue font on the slant face of the “8”. To change to “Annuity Due” or “Beginning”, press and release the blue “g” key in the lower left corner of the HP-12C and then press the “BEG” (Beginning / 7) key since you are in the “Blue text options” after pressing and releasing the blue “g” key. At this time the HP-12C will display “BEGIN” in the center, bottom of its display. To enter an “Ordinary Annuity” where payments are made at the end of the period, press and release the blue “g” key in the lower left corner of the HP-12C and then press the “END” (Ending / 8) key since you are in the “Blue text options” after pressing and releasing the blue “g” key. At this time the HP-12C display of “BEGIN” in the center, bottom of its display will disappear indicating that it is in the default mode of “Ordinary Annuity”.

**Clue:** While the HP-12C is in the “Annuity Due” mode – “BEGIN” indicating that the annuity payment is due at the beginning of the period there will be displayed in the center, bottom of the display. If the HP-12C is in the “END” there will be no additional display items as this is the default mode.

## Days Between Dates With The HP-12C

The Hewlett-Packard HP-12C will calculate the days between dates. A very nice function for accounts receivable and accounts payable aging as well as determining issues such as interest payments made or received every 30 days. To determine the days between the invoice date of January 24, 2004 and the date of March 15, 2004:

1. Turn the HP-12C on by pressing and releasing the “ON” button on the bottom left corner of the key pad.
2. Press the blue “g” key in the third column of the bottom row followed by the “M.DY” (“5” / “M.DY”) key, in the eighth column of the second row from the top. This sets the HP-12C to a date format of “01.242004” for January 24, 2004. Your instruction manual has other date formats available.
2. Type in the first date, January 24, 2004, as “01.242004” and press “Enter”.
3. Type in the second date of March 15, 2004 as “03.152004”.
4. Press and release the blue “g” key followed by the “▲DYS” (EEX / ▲DYS) in the sixth column of the second row from the top. This key reads as “Delta in days” with “▲” being an engineering symbol for “delta” or “Degree of change”. The “▲DYS” is in blue font on the slant face of the key since you are in the “g” (blue) key board options. The HP-12C should respond with “51” days between these two dates.

You can also calculate the date a note, such as a 120-day note, issued January 24, 2004 is due. To do this:

1. Turn the HP-12C on by pressing and releasing the “ON” button on the lower left corner of the key pad.
2. Press the “g” (blue) key in the third column of the bottom row followed by the “M.DY” (“5” / “M.DY”) key, in the eighth column of the second row from the top. This sets the HP-12C to a date format of “01.242004” for January 24, 2004. Your instruction manual has other date formats available.
2. Type in January 24, 2004 as “01.242004” and press “Enter”.
3. Type in “120” into the HP-12C. Do not hit the “ENTER” key.
4. Press the “g” (blue) key in the third column of the bottom row followed by the “DATE” (“CHS” / “DATE”) key, in the sixth column of the top row. The HP-12C should respond with “5,23,2004 7” indicating the note will be due on May 23, 2004, which is a Sunday as indicated by the trailing “7”.

**Tip:** Entering the days between dates value as a negative will generate a valid response for a earlier date. If you wanted a 180-day note payable on June 30, 2004, enter “06.302004” and press “ENTER”. Then enter “120” and press the “CHS” (change sign) key in the sixth column of the top row. The display will show “-120”. Press the blue “g” key followed by the “Date” key (“CHS” / “DATE”) again. The HP-12C will respond with “3,02,2004 2” indicating that the note should be issued Tuesday, March 2, 2004.

## Storing Values In The HP-12C

A major asset of a professional calculator like the HP-12C is the ability to store data. In the example you are issuing 10 year bonds. The bonds carry a face interest rate of 8% while the market is 7%. Interest is paid semi-annually. The issue consists of 1,500 bonds with face values of \$1,000 each. Your challenge is to identify the present value of the interest payments, the present value of the bonds, and the present value of the bond issue. The “Store” and “Recall” capability are major tools in this task.

First, determine the face value of the bonds – 1,500 bonds X \$1,000 = \$1,500,000 by typing in “1500” and pressing and releasing the “Enter” key. Then type in “1000” and press and release the “X” (multiply) key. The display will show “1,500,000”. Now use the keystrokes “STO” (Store) near the bottom of the calculator in the fourth column, followed by pressing and releasing the “1” key. This will store \$1,500,000 into the Storage Register 1.

Now you will address the present value of the bonds.

While the \$1,500,000 is still in the display, press and release the “FV” (Future value) key to record this value into that field.

Type in “0” (zero) and press and release the “PMT” (Payment) button. It is recommended that you develop a discipline of entering values in all the TVM (Time value of money) fields from left to right or right to left to ensure previous values do not enter your current calculation. This field will remain at “0” for this calculation.

Type in “0” (zero) and press and release the “PV” button. It is recommended that you develop a discipline of entering values in all the TVM (Time value of money) fields from left to right or right to left to ensure previous values do not enter your current calculation. This will be your “solve” value in a couple of steps.

Type in the market interest rate as a whole number – “7” then press and release “ENTER” key, enter “2” followed by the  $\div$  (division) key. The display will properly state the annual (stated) interest rate a period of interest rate of 3 ½%. Press and release the “i” (Interest) key to enter the value into the interest field.

Type in “10”, the life of the bonds in years, then press and release the “ENTER” key followed by “2” and the “X” (Multiply) key in the right most column of the calculator. The display should read “20”. Press and release the “n” (Period) key to enter this value into the “Number of periods” or “life” register.

Now press and release the “PV”(Present value) key in the third column of the top row. The HP-12C should respond with “-753,848.8266”. This is the present value of the bonds.

Press and release the “STO” button in the fourth column of the bottom row followed by the “2”. You have now stored that value into the second storage register.

To solve the present value of the interest payments, enter “0” (zero) into the HP-12C and press and release the “FV” (Future value) key.

Press and release the “RCL” (Recall) key, in the fourth column of the bottom row of the key pad, followed by the “1” key. The value stored in the first memory register, “1,500,000” should appear in the display.

Press and release the “ENTER” key then enter “8” and press and release the “%” for the face interest rate in the fifth column of the second row from the top. The display should show “120,000.0000”. Now enter “0.5” indicating semi-annual interest payments. Press and release the “X” (multiply) key on the right side of the HP-12C. The display should show the cash interest payments of “60,000.0000”.

Press and release the “STO” (Store) key and then the “3” key to place this value in the third storage register.

The “60,000.0000” value should still be in the display. Press and release the “PMT” (Payment) key.

Press and release the “PV” (Present value) key and the HP-12C should display “-852,744.1981”, the present value of the interest payments.

The “N” (Periods) and “I/Y” fields were entered in your first calculation for the present value of the bonds and you have not changed them in this short period of time so reentry was not necessary.

Press and release the “STO” (Store) key followed by the “4” to store this value in the fourth memory register.

The present value of the bonds is the sum of: “RCL” “2”, “ENTER”, and “-753,848.8266” should appear. Press and release the “RCL” (Recall) key followed by pressing and releasing the “4” key and the display should read “-852,744.1981”.

Press the “+” (Plus) sign to display the sum of these two numbers – “-1,606,593.025”. Since your display was set to four significant digits but the HP-12C needed one of those places to display a whole number it took it away. This value is the present value of the bonds.

While the “-1,606,593.025” is in the display, press and release the “STO” (Store) button followed by the “5” to store this value.

To determine the premium or discount, recall the value in memory register 1 by “RCL” “1” and ADD these numbers as one is a positive value while the other is a negative value, the premium of “-106,593.025” on this bond issue. Store this value in memory register by pressing “STO” followed by “6”.

Now, the bond issue is stored in “1”, the present value of the bonds is stored in “2”, the cash interest payments are stored in “3”, the present value of the interest payments is stored in “4”, the present value of the bond issue is stored in “5”, and the premium is stored in “6”.

The memory registers can be “overwritten” or “rewritten” by simply “STO” and the specific registry number. All the memory registers can be cleared at one time by the keystrokes the yellow “f” key followed by the “Clear – Reg” key which is in the fifth column and the third row for the top which has white text of “CLX and orange/yellow text above it labeled “REG” which is under the “Gang title” of “Clear”. The valid registers are from “0” (zero) through “9” (nine).

## Balloon Payments With The HP-12C

The Hewlett-Packard HP-12C (HP-12C) respects cash and value inflows and outflows. If the present value (PV) (or principle) entered is positive indicating cash inflows or value inflows to you, then the payment (PMT) or future value (FV) will be an outflow or a negative value. However, for most uses you realize that you are getting a loan or making a loan and enter the present value (PV) as positive to save keystrokes and simply read “-691.3918” as “\$691.39” as your payment or cash outflow. However, assume that in this loan example, you are buying a \$35,000 vehicle, the loan term is 60 months, the interest is 6.9% annually, and you are going to make a balloon payment of \$5,000 at the end of the loan with and payments are made monthly. “N” or number of periods is (5 years X 12 months) “60”, “i” or interest is “6.9 ENTER 12 ÷” or “0.5750”, “PV” or present value is “35000”, and “PMT” or payment is 0 as a matter of discipline. Now cash flow representation is important. Since the balloon payment is cash flow out and the principle is cash flow in, if the principle is positive, then the balloon payment or “FV” – future value, must be negative. If you had entered the 35000 as a negative number representing cash flow or value flow out, then the balloon payment entered in “FV” must be positive. When “5000” is entered into the HP-12C you will need to press the “CHS” key in the sixth column of the top row of the key pad to convert the positive value to negative “-5000”. Now press and release the “FV” key to enter the negative “5000” into that field. Now press “PMT” (Payment) the key in the fourth column of the top row. The HP-12C should return -621.13716. Without the balloon payment your payment was \$691.3918, with the balloon payment your payment is only \$621.3716. Had the balloon payment been put in as a positive number matching the “PV” or present value field, the payment would be -761.4121 or \$761.4121. Which fails a basic logic evaluation of lower your payment level by the balloon payment.

## Time Value Of Money With The HP-12C

The Hewlett-Packard HP-12C (HP-12C) utilizes the same field identities as the accounting and financial professionals in the calculation of the time values of money. On the top row of keys of the HP-12C from left to right (column 1 through column 5) you are presented with:

- “n” for the number of periods for the event. There is a way to turn years into months with the HP-12C. In the loan example the term is 5 years. Enter “5” into the HP-12C, then press the blue “g” key followed by the “12X”, which is the “n” key in the upper left corner of the key pad. By pressing the blue “g” key first you enter a secondary key pad which states “Take the input value and multiply it by 12” when you press the “n” key. The display will show “60”, the result of 5 years multiplied by 12 months per year. No additional settings or actions are required to take advantage of this function. If you press “RCL” (Recall) in the bottom row of the key pad followed by the “n” key you will see the value of “60”.
  - “i” is for interest for the event. The HP-12C is expecting interest in whole values so 6.9% is entered as “6.9”. If this is an annual interest rate and interest is compounded monthly you can enter the “6.9” followed by blue “g” key followed by the “12÷”, which is the “i” key in the second column of the upper row of the key pad. By pressing the blue “g” key first you enter a secondary key pad which states “Take the input value and divide it by 12” when you press the “i” key. The display will show “0.5750”, the result of 6.9(%) divided by 12 months per year. No additional settings or actions are required to take advantage of this function.
  - “PV” is the present value field. For this example you will remain with the basic loan and conform to discipline. Since the cash flow or value is in, it will be positive, so enter 35000 into the HP-12C and press and release the “PV” key in the third column of the top row.
  - “PMT” is the payment field. Since you are trying to solve for payment and want to ensure every field’s value, enter “0” (zero) into the HP-12C and press the “PMT” key.
  - “FV” is the future value field. For this example you will retain your balloon payment issue. Since the “PV” or present or principle value is positive, this must be negative indicating that you are making the payment, representing cash flows out, at the end of the loan. Enter 5000 into the HP-12C then press and release the “CHS” (Change sign) key in the sixth column of the top row of the HP-12C. The display changes to -5,000. Press and release the “FV” future value key in the fifth column of the top row.
- Now solve for “PMT” or payment by pressing the “PMT” (Payment) button in the fourth column of the top row of the HP-12C. The HP-12C should respond with -621.3716 indicating our payment is \$621.3716.

## Present Value Of A \$1 With The HP-12C

You need the present value of \$1 with 15 periods at 15% interest and no payments, the fields would be:

$$n = 15$$

$$i = 15$$

PV = 0 as a matter of discipline to ensure the values in the HP-12C.

PMT = 0 as a matter of discipline to ensure the values in the HP-12C.

$$FV = 1$$

When “PV” (Present value) is pressed and released the HP-12C should respond with 0.1229 which can be checked with printed present value table for validity.

To find the present value of \$150 with 15 periods at 15% interest and no payments, the fields would be:

$$n = 15$$

$i = 15$

$PV = 0$  as a matter of discipline to ensure the values in the HP-12C.

$PMT = 0$  as a matter of discipline to ensure the values in the HP-12C.

$FV = 150$

When “PV” (Present value) is pressed and released the HP-12C should respond with -18.4342 which can be checked with printed present value table for validity by multiplying  $\$150 \times 0.1229 = \$18.4350$  and the difference is a rounding factor.

### Future Value Of A \$1 With The HP-12C

You need the future value of \$1 with 15 periods at 15% interest and no payments, the fields would be:

$n = 15$

$i = 15$

$PV = 1$

$PMT = 0$  as a matter of discipline to ensure the values in the HP-12C.

$FV = 0$  as a matter of discipline to ensure the values in the HP-12C.

When “FV” is pressed and released. The response should be -8.1371 which can be checked with printed future value table for validity.

To find the future value of \$150 with 15 periods at 15% interest and no payments, the fields would be:

$n = 15$

$i = 15$

$PV = 150$

$PMT = 0$  as a matter of discipline to ensure the values in the HP-12C.

$FV = 0$  as a matter of discipline to ensure the values in the HP-12C.

When “FV” (Future value) is pressed and released the HP-12C response should be -1,220.5592 which can be checked with printed future value table for validity by multiplying  $\$150 \times 8.1371 = \$1,220.5650$  and the difference is a rounding factor.

### Present Value Of An Annuity of \$1 With The HP-12C

You need the present value of an annuity of \$1 with 15 periods at 15% interest and no future value. The payments are to be made at the end of the period. The fields would be:

$n = 15$

$i = 15$

$PV = 0$  as a matter of discipline to ensure the values in the HP-12C.

$PMT = 1$

$FV = 0$  as a matter of discipline to ensure the values in the HP-12C.

When “PV” is pressed and released the response should be -5.8474 which can be checked with printed present value of an annuity table for validity.

To find the present value of an annuity of \$150 with 15 periods at 15% interest and no future value. The payments are to be made at the end of the period. The fields would be:

$n = 15$

$i = 15$

$PV = 0$  as a matter of discipline to ensure the values in the HP-12C.

$PMT = 150$

$FV = 0$  as a matter of discipline to ensure the values in the HP-12C.

When “PV” is pressed and released the HP-12C should respond with -877.1055 which can be checked with printed present value of an annuity table for validity by multiplying  $\$150 \times 5.8474 = 877.1100$  and the difference is a rounding factor.

For the present value of an annuity due, change the HP-12C into “BEGIN” or “Beginning” mode (due) by utilizing the keystrokes:

1. Press and release the blue “g” key once. This key is in the third column of the bottom row.
2. Press and release the blue font “BEG” (7 / BEG) key, this text is shown below the “7” on the slant face in the top row of the key pad, the seventh column. The blue text on the slant face of the key is used since you are in the “blue” or “g” keyboard options.
3. The display should show “BEGIN in the bottom, center of the display.

Recomputing the example as an annuity due by pressing the “PV” (Present value) key should result in a value -1,008.6713.

To change to “ordinary annuity” or an annuity paying at the end of the period:

1. Press and release the blue “g” key once. This key is in the third column of the bottom row.
2. Press and release the blue font “END” (8 / END) key, this text is shown below the “8” on the slant face in the top row of the key pad in the eighth column. The blue text on the slant face of the key is used since you are in the “blue” or “g” keyboard options.
3. The display of “BEGIN in the bottom, center of the display will disappear as this is the default mode.

## Future Value Of An Annuity Of \$1 With The HP-12C

You need the future value of an annuity of \$1 with 15 periods at 15% interest and payments at the end of the periods – ordinary annuity, the fields would be:

$$n = 15$$

$$i = 15$$

PV = 0 as a matter of discipline to ensure the values in the HP-12C.

$$PMT = 1$$

FV = 0 as a matter of discipline to ensure the values in the HP-12C.

When “FV” (Future value) key in the fifth column of the top row is pressed and released the HP-12C response should be -47.5804 which can be checked with printed future value of an annuity table for validity.

To find the future value of an annuity of \$150 with 15 periods at 15% interest and payments made at the end of the periods, the fields would be:

$$n = 15$$

$$i = 15$$

PV = 0 as a matter of discipline to ensure the values in the HP-12C.

$$PMT = 150$$

$$FV = 0$$

Then press and release the “FV” (Future value) key. The response should be -7,137.0616 which can be checked with printed future value of an annuity table for validity by multiplying  $\$150 \times 47.5804 = 7,137.0616$  and the difference is a rounding factor.

For the present value of an annuity due, change the HP-12C into “BEGIN” or “Beginning” mode (due) by utilizing the keystrokes:

1. Press and release the blue “g” key once. This key is in the third column of the bottom row.
2. Press and release the blue font “BEG” (7 / BEG) key, this text is shown below the “7” on the slant face in the top row of the key pad, the seventh column. The blue text on the slant face of the key is used since you are in the “blue” or “g” keyboard options.

Recomputing the example as an annuity due by pressing and releasing the “FV” (Future value) key. The HP-12C should respond with a value of “-8,207.6209”.

To change to “ordinary annuity” or an annuity paying at the end of the period:

1. Press and release the blue “g” key once. This key is in the third column of the bottom row.
2. Press and release the blue font “END” (8 / END) key, this text is shown below the “8” on the slant face in the top row of the key pad in the eighth column. The blue text on the slant face of the key is used since you are in the “blue” or “g” keyboard options.
3. The display of “BEGIN in the bottom, center of the display will disappear as this is the default mode.

### **Other HP-12C Functions**

There are other HP-12C functions explained in the Hewlett-Packard HP-12C manuals and documents. Some of these include the determination of the present value of a bond issue through a single math function, net present value, internal rate of return, and depreciation functions.

# CHAPTER 20

## TEXAS INSTRUMENT BA II+

### CHAPTER OUTLINE

Texas Instruments BA II+ Basics	Present Value Of An Annuity Of A \$1 With The BA II+
Days Between Dates With The BA II+	Storing Values In The BA II+
Balloon Payments With the BA II+	Future Value Of An Annuity Of A \$1 With The BA II+
Time Value Of Money With the BA II+	Other BA II+ Functions
Present Value Of A \$1 With The BA II+	
Future Value Of A \$1 With The BA II+	

### **Texas Instrument BA II+ Basics**

The Texas Instruments TI BA II+ (Plus) Advanced Business Analyst Calculator is a powerful tool that, if learned, can greatly assist you in your academic endeavors, accounting, financial, and business career. The BA II+ has an extensive manual and many features, only a few will be addressed here.

First, the BA II+ default for significant digits displayed is two shown as “0.00”. In most academic, accounting, financial, and business situations four or five significant digits are appropriate. And, when the requirement is less, the few extra digits displayed can easily be ignored. They will also be hidden if the BA II+ needs more display room for whole numbers. To set or change the number of decimal places displayed in the BA II+’s display follow these steps:

1. Turn the BA II+ on by pressing and releasing the “On/Off” button on the upper right corner of the key pad.
2. Press and release the yellow “2nd” key once. This key is in the first column of the second row.
3. Press and release the “Format” key. This is in yellow text above the “.” (period) key in the center of the bottom row. The yellow text above the key is used since you are in the “2nd” keyboard option as selected in step 2.
4. Press and release the “4” key, if four significant digits are desired, or, press any number from 0 through 8.
5. Press and release the “Enter” key on the first row, second column.
6. Press “CE/C” on the lower left corner of the keyboard to clear the display and return to normal operations.
7. Now test the calculator, if you chose “4” as the significant digits, dividing 0.025 by 30 is actually 0.000833333..... When the BA II+ is asked for this calculation while set to four significant digits the response should be “0.0008” since the trailing 3s round down and therefore, “off” the display. This value is still held in memory, without rounding, for future calculations. Multiply the display by 100,000 and the result should be 83.3333 – demonstrating that the non-displayed values are not lost.



8. Now divide 0.025 by 26. The BA II+ should return “0.0010” while the actual value is 0.00096154 and it has been rounded up to “0.0010”. Multiply the display by 100,000 and the result should be “96.1538” – again demonstrating that the non-displayed values are not lost.

Second, the BA II+ comes defaulted to compute the time value of money with monthly payments and interest compounding – set for car dealers and real estate agents. In the academic, accounting, financial, and business world, interest is frequently compounded in daily, monthly, quarterly, semi-annual, and annual terms. To insure that the BA II+ will handle most of these options without getting them confused it is recommended that you set the payments and compounding periods (P/Y = Payments per year and C/Y = Compounding periods per year) to “1” so that you can control the payment and compounding periods as follows:

1. Turn the BA II+ on by pressing and releasing the “On/Off” button on the upper right corner of the key pad.
2. Press and release the yellow “2nd” key once. This key is in the first column of the second row.
3. Press and release the “P/Y” key, this text is shown above the “I/Y” key on the third row in the second column. The yellow text above the key is used since you are in the “2nd” keyboard options as selected in step 2.
4. The display should show “P/Y=” and a value such as “12”. Enter “1” and then press the “Enter” key.
5. Press the up arrow or down arrow on the first row in the third or fourth column.
6. Check the value of “C/Y” and insure that it is also “1”. If it is not, enter “1” and then press the “Enter” key.
7. Press “Clear” to return to the normal operations mode of the calculator.

As a test, you are going to determine the payment for a \$35,000 vehicle, the loan term is 60 months, the interest is 6.9% annually and payments are made monthly. The BA II+ time value of money keys are the five keys in the third row labeled “N” for number of periods, “I/Y” for the interest rate, “PV” for the present value, “PMT” for payments, and “FV” for future value.

**Tip:** When using the time value of money function on the calculator develop the habit of entering values in all “fields” from left to right or right to left even if that value is “0” (zero). This should preclude any old values from entering the equation unexpectedly.

For the example loan, enter 60 into the keypad and press and release the “N” key in the first column of the third row. Then enter 6.9% by typing in 6.9 then press and release the division ( $\div$ ) key and type in 12 followed by the equal sign. This provides the period interest rate (6.9 / 12) of 0.5750. Enter this into the interest field by pressing the “I/Y” key in the second key in the third row.

**Clue:** “I/Y” converts the value input into a percentage so had you entered 6.9%/12 or 0.00575, the final calculation will be off.

Type in the \$35,000 as 35000 and press the “PV” key, the center key in the third row. Since the object is to compute payment (PMT), type in “0” (zero) and press the “PMT” or payment key, the key in the fourth column of the third row. This will preclude any residual value from carrying over. Since there is no balloon payment on this loan, type in “0” (zero) and press the “FV” or future value key. Now press and release the “CPT” (compute) in the upper left corner of the keyboard. Now press and release the “PMT” or payment key. The BA II+ should calculate -691.3918 indicating that for only \$691.39 a month you can have that used, minimum option, SUV hidden on the back lot.

**Clue:** The asterisks appearing above the value of the payment indicates that this value is computed, not inputted by you.

The payment is negative since the present value or principle was entered as a positive indicating a cash or value in to you. If you wanted true discipline, you would enter the present value (in this example) as positive number since it was value inflow to you and cash outflow in payments will be negative. However, if you were the used car salesman and wanted discipline, in the data enter, type in 35000 and then press the +/- key just inside the bottom right corner of the keyboard. This will convert a positive

display to a negative value (or a negative value to a positive value). Rerun the calculation simply by placing a -35000 (negative) into the present value field and recompute the payment. This time the BA II+ should show 691.3918, a positive value since the present value is negative and it indicates the payments will be cash in flows or value inflows.

Annuities can be paid at the beginning or the end of the payment period. To make this change there is a “Toggle” function – the same keystrokes once will place it in the opposite mode of what it was in. So if you run this set of keystrokes from the default of “END”, the BA II+ will be switched to “BGN” or “Beginning” for annuity due. If it was in “BGN” for annuity due, the process will switch it to an ordinary annuity or one paid at the end of the period. The keystrokes for this toggle on the BA II+ are:

1. Turn the BA II+ on by pressing and releasing the On/Off button on the upper right corner of the key pad.
2. Press and release the yellow “2nd” key once. This key is in the first column of the second row.
3. Press and release the “BGN” key, this text is shown above the “PMT” key on the third row in the fourth column. The yellow text above the key is used since you are in the “2nd” keyboard options as selected in step 2.
4. The display should show “END” or “BGN” to indicate which mode you are currently in. If this is the mode you desire, press and release the “CE/C” key on the lower left corner of the key pad to cancel the toggle process.
5. If you want to change from “End” to “Beginning” or from “Beginning” to “End, press and release the “2nd” key once, from this intermediate position.
6. Then press and release the “SET” key once. This key is in the second column of the first row. The display will change from “END” to “BGN” or from “BGN” to “END”.
7. Press and release the “C/CE” key to return to the normal operations of the BA II+.

**Clue:** While the BA II+ is in the “Annuity Due” mode – “BGN” indicating that the annuity payment is due at the beginning of the period there will be displayed near the top and towards the right side of the display. If the BA II+ is in the “END” there will be no additional display items as this is the default mode.

## Days Between Dates With The BA II+

The Texas Instrument BA II+ will calculate the days between dates. A very nice function for accounts receivable and accounts payable aging as well as determining issues such as interest payments made or received every 30 days. To determine the days between the invoice date of January 24, 2004 and the date of March 15, 2004:

1. Turn the BA II+ on by pressing and releasing the On/Off button on the upper right corner of the key pad.
2. Press and release the yellow “2nd” key once. This key is in the first column of the second row.
3. Press and release the “DATE” key, this text is shown above the “1” key on the key pad. The yellow text above the key is used since you are in the “2nd” keyboard options as selected in step 2.
4. The display should show “DT1=” for Date 1. To enter the date of January 24, 2004, enter “01.2404” and press and release the “ENTER” in the second column of the first row. The display should show “DT1= 1 - 24 - 2004”.
5. Use the up or down arrows in the third and fourth columns of row one to display the “DT2=” screen. This screen may contain a date from previous work or a default date. Enter March 15, 2004 as “03.1504” and press and release the “ENTER” key. The display should show “DT2= 3 - 15 - 2004”.
6. Use the up and down arrows in the third and fourth columns of row one to display the “DBD=” screen. This screen may show a value from a previous computation. Press the “CPT” button in the first column of the first row. The BA II+ should display “DBD= 51.000”, days between dates is 51.

**Hint:** Each time a new date is entered the “CPT” process must be run again to generate the correct number of days between dates.

You can also calculate the date a note, such as a 120-day note, issued January 24, 2004 is due. To do this:

1. Turn the BA II+ on by pressing and releasing the On/Off button on the upper right corner of the key pad.
2. Press and release the yellow “2nd” key once. This key is in the first column of the second row.
3. Press and release the “DATE” key, this text is shown above the “1” key on the key pad. The yellow text above the key is used since you are in the “2nd” keyboard options as selected in step 2.
4. The display should show “DT1=” for Date 1. To enter the date of January 24, 2004, enter “01.2404” and press and release the “ENTER” in the second column of the first row. The display should show “DT1= 1 - 24 - 2004”.
5. Use the up or down arrows in the third and fourth columns of row one to display the “DBD=” screen. This screen may contain a value from previous work or a default value. Enter “120” and then press and release the “ENTER” key. The display should show “DBD= 120”.
6. Use the up and down arrows in the third and fourth columns of row one to display the “DT2=” screen. This screen may show a date from a previous computation or a default date. Press the “CPT” button in the first column of the first row. The BA II+ should display “DT2= 5 - 23 - 2004”. The date a 120-day note issued on January 24, 2004 would be due.

**Tip:** Entering the “DBD” (Days between dates) value as a negative will generate a valid response for an earlier date. If you wanted a 180-day note payable on June 30, 2004, enter “DT1” as “06.3004” and “DBD” as “-180” and then compute “DT2” to determine that the note should be issued January 02, 2004, displayed as “Fri= 1-02-2004”.

## Storing Values In The BA II+

A major asset of a professional calculator like the BA II+ is the ability to store data. In the example you are issuing 10 year bonds. The bonds carry a face interest rate of 8% while the market is 7%. Interest is paid semi-annually. The issue consists of 1,500 bonds with face values of \$1,000 each. Your challenge is to identify the present value of the interest payments, the present value of the bonds, and the present value of the bond issue. The “Store” and “Recall” capability are major tools in this task.

First, determine the face value of the bonds – 1,500 bonds X \$1,000 = \$1,500,000 and use the keystrokes “STO” (Store) near the bottom of the calculator in the first column, followed by pressing and releasing the “1” key. This will store \$1,500,000 into the Storage Register 1.

Now you will address the present value of the bonds.

While the \$1,500,000 is still in the display, press and release the “FV” (Future value) key to record this value into that field.

Type in “0” (zero) and press and release the “PMT” (Payment) button. It is recommended that you develop a discipline of entering values in all the TVM (Time value of money) fields from left to right or right to left to ensure previous values do not enter your current calculation. This field will remain at “0” for this calculation.

Type in “0” (zero) and press and release the “PV” button. It is recommended that you develop a discipline of entering values in all the TVM (Time value of money) fields from left to right or right to left to ensure previous values do not enter your current calculation. This will be your solve value in a couple of steps.

Type in the market interest rate as a whole number – “7” then press and release the  $\div$  (division) key, enter “2” and press and release the equal sign to properly state the annual (stated) interest rate a period of interest rate of 3 ½%. Press and release the “I/Y” (Interest) key to enter the value into the interest field.

Type in “10”, the life of the bonds in years, then press and release the “X” (Multiply) key in the right most column of the calculator followed “2”, the number of interest periods per year by the “=” (Equal)

sign. The display should read “20”. Press and release the “N” (Period) key to enter this value into the “Number of periods” or “life” register.

Now press and release the “CPT” (Compute) key in the upper, left corner of the calculator followed by the “PV” (Present value) key in the center of the TVM row. The BA II+ should respond with “PV= -753,848.8266”. This is the present value of the bonds.

Press and release the “STO” button in the first column near the left, bottom corner followed by the “2”. You have now stored that value into the second storage register.

To solve the present value of the interest payments, enter “0” (zero) into the BA II+ and press and release the “FV” (Future value) key.

Press and release the “RCL” (Recall) key, near the left bottom corner of the key pad, followed by the “1” key. The value stored in the first memory register, “1,500,000” should appear in the display.

Press and release the “X” (Multiply) key followed by the “(” (Open parenthesis) then press and release the “8”, the face interest rate, press and release the “%” (Percentage) key, followed by the “÷” (Division) followed by “2” and then the “)” parenthesis. The display will show “0.04”. This is the period interest rate of the face or stated interest rate (8% / 2). Since you already have “1,500,000” and “X” hovering in cyberspace from the earlier step, press “=” (Equal) and the BA II+ should respond with 60,000.00. This is your period interest payment in cash.

Press and release the “STO” (Store) key and then the “3” key to place this value in the third storage register.

The \$60,000.0000 value should still be in the display. Press and release the “PMT” (Payment) key.

Press and release the “CPT” key followed by the “PV” (Present value) key and the BA II+ should display “PV= -852,744.1981”, the present value of the interest payments.

The “N” (Periods) and “I/Y” fields were entered in your first calculation for the present value of the bonds and you have not changed them in this short period of time so reentry was not necessary.

Press and release the “STO” (Store) key followed by the “4” to store this value in the fourth memory register.

The present value of the bonds is the sum of: “CE/C” to clear the display and working register to preclude bring in an unintended value, “RCL” “2”, and “-753,848.8266” should appear. Press and release the “+” (Plus) key followed by “RCL” (Recall) and then the “4” key and the display should read “-852,744.1981”.

Press the “=” (Equal) sign to display the sum of these two numbers – “-1,606,593.025”. Since your display was set to four significant digits but the BA II+ needed one of those places to display a whole number it took it. This value is the present value of the bonds.

While the “-1,606,593.025” is in the display, press and release the “STO” (Store) button followed by the “5” to store this value.

To determine the discount, recall the value in memory register 1 by “RCL” “1” and ADD these numbers as one is a positive value while the other is a negative value, the premium of “\$106,593.0248” on this bond issue. Store this value in memory register by pressing “STO” followed by “6”.

Now, the bond issue is stored in “1”, the present value of the bonds is stored in “2”, the cash interest payments are stored in “3”, the present value of the interest payments is stored in “4”, the present value of the bond issue is stored in “5”, and the premium is stored in “6”.

The memory registers can be “overwritten” or “rewritten” by simply “STO” and the specific registry number. All the memory registers can be cleared at one time by the keystrokes “2ND” then “MEM” (the text above the “0” key), the “2ND” again followed by the “CE/C” key. The valid registers are from “0” (zero) through “9” (nine).

## Balloon Payments With The BA II+

The Texas Instruments BA II Plus (BA II+) respects cash and value inflows and outflows. If the present value (PV) (or principle) entered is positive indicating cash inflows or value inflows to you, then the payment (PMT) or future value (FV) will be an outflow or a negative value. However, for most uses you realize that you are getting a loan or making a loan and enter the present value (PV) as positive to save keystrokes and simply read “-691.3918” as “\$691.39” as your payment or cash outflow. However, assume that in this loan example, you are buying a \$35,000 vehicle, the loan term is 60 months, the interest is 6.9% annually, and you are going to make a balloon payment of \$5,000 at the end of the loan with and payments are made monthly. “N” or number of periods is (5 years X 12 months) 60, “I/Y” or interest is 6.9 /12 months or 0.5750, “PV” or present value is 35000, and “PMT” or payment is 0 as a matter of discipline. Now cash flow representation is important. Since the balloon payment is cash flow out and the principle is cash flow in, if the principle is positive, then the balloon payment or “FV” – future value, must be negative. If you had entered the 35000 as a negative number representing cash flow or value flow out, then the balloon payment entered in “FV” must be positive. When 5000 is entered into the BA II+ you will need to press the “+/-” key near the bottom right corner of the key pad to convert the positive value to negative -5000. Now press and release the “FV” key to enter the negative 5000 into that field. Now press “CPT” the key in the first column of the first row and then the “PMT” or payment key. The BA II+ should return -621.13716. Without the balloon payment your payment was \$691.3918, with the balloon payment your payment is only \$621.3716. Had the balloon payment been put in as a positive number matching the “PV” or present value field, the payment would be -761.4121 or \$761.4121. Which fails a basic logic evaluation of lower your payment level by the balloon payment.

## Time Value Of Money With The BA II+

The Texas Instrument BA II Plus (BA II+) utilizes the same field identities as the accounting and financial professionals in the calculation of the time values of money. On the third row of keys of the BA II+ from left to right (column 1 through column 5) you are presented with:

“N” for the number of periods for the event. If you set your BA II+ up as earlier discussed with “1” in the “P/Y” and “C/Y” parameters, this value is easy to determine. If the loan is for 5 years and payments as well as interest is compounded monthly, enter the value of 5 into the BA II+ then press the “X” (times) key in the right column of the BA II+, then press “12” followed by the “=” (equal sign). The display will now indicate “60.000” representing the periods of the loan, in this example, months. Now press and release the “N” or number of periods key in the first column of the second row.

“I/Y” is interest per year and, if the BA II+ has been set up as previously discussed, this is now interest per period. Since it is interest per period and the interest rate is provided as annually, enter the interest rate of 6.9 and ***DO NOT PRESS THE “%” KEY.*** Now divide this value by the same factor as you multiplied the term by – 12. So press and release the “÷” (divide) key followed by the “=” (equal sign). The display should show 0.5750. Press and release the “I/Y” key to enter the value into the “I” or interest field.

“PV” is the present value field. For this example you will remain with the basic loan and conform to discipline. Since the cash flow or value is in, it will be positive, so enter 35000 into the BA II+ and press and release the “PV” key in the third column of row three.

“PMT” is the payment field. Since you are trying to solve for payment and want to ensure every field’s value, enter “0” (zero) into the BA II+ and press the “PMT” key.

“FV” is the future value field. For this example you will retain your balloon payment issue. Since the “PV” or present or principle value is positive, this must be negative indicating that you are making the payment, representing cash flows out, at the end of the loan. Enter 5000 into the BA II+ then press and release the “+/-“ key near the bottom right corner of the BA II+. The display changes to -5,000. Press and release the “FV” future value key in the fifth column of the third row.

Now solve for “PMT” or payment by pressing the “CPT” (Compute) button in the upper left corner of the BA II+ followed by pressing and releasing the “PMT” (payment) key and the BA II+ should respond with -621.3716 indicating our payment is \$621.3716.

### **Present Value Of A \$1 With The BA II+**

You need the present value of \$1 with 15 periods at 15% interest and no payments, the fields would be:

$$N = 15$$

$$I/Y = 15$$

PV = 0 as a matter of discipline to ensure the values in the BA II+.

PMT = 0 as a matter of discipline to ensure the values in the BA II+.

$$FV = 1$$

Then “CPT” and “PV”. The response should be -0.1229 which can be checked with printed present value table for validity.

To find the present value of \$150 with 15 periods at 15% interest and no payments, the fields would be:

$$N = 15$$

$$I/Y = 15$$

PV = 0 as a matter of discipline to ensure the values in the BA II+.

PMT = 0 as a matter of discipline to ensure the values in the BA II+.

$$FV = 150$$

Then “CPT” and “PV”. The response should be -18.4342 which can be checked with printed present value table for validity by multiplying  $\$150 \times 0.1229 = \$18.4350$  and the difference is a rounding factor.

### **Future Value Of A \$1 With The BA II+**

You need the future value of \$1 with 15 periods at 15% interest and no payments, the fields would be:

$$N = 15$$

$$I/Y = 15$$

$$PV = 1$$

PMT = 0 as a matter of discipline to ensure the values in the BA II+.

FV = 0 as a matter of discipline to ensure the values in the BA II+.

Then “CPT” and “FV”. The response should be -8.1371 which can be checked with printed future value table for validity.

To find the future value of \$150 with 15 periods at 15% interest and no payments, the fields would be:

$$N = 15$$

$$I/Y = 15$$

$$PV = 150$$

PMT = 0 as a matter of discipline to ensure the values in the BA II+.

FV = 0 as a matter of discipline to ensure the values in the BA II+.

Then “CPT” and “FV”. The response should be -1,220.5592 which can be checked with printed future value table for validity by multiplying  $\$150 \times 8.1371 = \$1,220.5650$  and the difference is a rounding factor.

### Present Value Of An Annuity of \$1 With The BA II+

You need the present value of an annuity of \$1 with 15 periods at 15% interest and no future value. The payments are to be made at the end of the period. The fields would be:

N = 15

I/Y = 15

PV = 0 as a matter of discipline to ensure the values in the BA II+.

PMT = 1

FV = 0 as a matter of discipline to ensure the values in the BA II+.

Then “CPT” and “PV”. The response should be -5.8474 which can be checked with printed present value of an annuity table for validity.

To find the present value of an annuity of \$150 with 15 periods at 15% interest and no future value. The payments are to be made at the end of the period. The fields would be:

N = 15

I/Y = 15

PV = 0 as a matter of discipline to ensure the values in the BA II+.

PMT = 150

FV = 0 as a matter of discipline to ensure the values in the BA II+.

Then “CPT” and “PV”. The response should be -877.1055 which can be checked with printed present value of an annuity table for validity by multiplying  $\$150 \times 5.8474 = 877.1100$  and the difference is a rounding factor.

For the present value of an annuity due, change the BA II+ into “BGN” or “Beginning” mode (due) by utilizing the keystrokes:

1. Press and release the yellow “2nd” key once. This key is in the first column of the second row.
2. Press and release the “BGN” key, this text is shown above the “PMT” key on the third row in the fourth column. The yellow text above the key is used since you are in the “2nd” keyboard options as selected in step 2.
3. The display should show “END” or “BGN” to indicate which mode you are currently in. If this is the mode you desire, press and release the “CE/C” key on the lower left corner of the key pad to cancel the toggle process.
4. If you want to change from “End” to “Beginning”, press and release the “2nd” key once, from this intermediate position.
5. Then press and release the “SET” key once. This key is in the second column of the first row. The display will change from “END” to “BGN”.
6. Press and release the “C/CE” key to return to the normal operations of the BA II+.
7. You will have a “BGN” text string in the upper right area of the display while in this mode.

Recomputing the example as an annuity due should result in a value -1,008.6713.

The steps of 1 through 6 are “toggles”. Accomplishing them again should result in a “BGN” in step 2 and “END” in step 5.

### Future Value Of An Annuity Of \$1 With The BA II+

You need the future value of an annuity of \$1 with 15 periods at 15% interest and payments made at the end of the periods – ordinary annuity, the fields would be:

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$$N = 15$$

$$I/Y = 15$$

PV = 0 as a matter of discipline to ensure the values in the BA II+.

$$PMT = 1$$

$$FV = 0$$

Then “CPT” and “FV”. The response should be -47.5804 which can be checked with printed future value of an annuity table for validity.

To find the future value of an annuity of \$150 with 15 periods at 15% interest and payments are made at the end of the periods, the fields would be:

$$N = 15$$

$$I/Y = 15$$

PV = 0 as a matter of discipline to ensure the values in the BA II+.

$$PMT = 150$$

$$FV = 0$$

Then “CPT” and “FV”. The response should be -7,137.0616 which can be checked with printed future value of an annuity table for validity by multiplying  $\$150 \times 47.5804 = 7,137.0600$  and the difference is a rounding factor.

For the future value of an annuity due, change the BA II+ into “BGN” or “Beginning” mode (due) by utilizing the keystrokes:

1. Press and release the yellow “2nd” key once. This key is in the first column of the second row.
2. Press and release the “BGN” key, this text is shown above the “PMT” key on the third row in the fourth column. The yellow text above the key is used since you are in the “2nd” keyboard options as selected in step 2.
3. The display should show “END” or “BGN” to indicate which mode you are currently in. If this is the mode you desire, press and release the “CE/C” key on the lower left corner of the key pad to cancel the toggle process.
4. If you want to change from “End” to “Beginning”, press and release the “2nd” key once, from this intermediate position.
5. Then press and release the “SET” key once. This key is in the second column of the first row. The display will change from “END” to “BGN”.
6. Press and release the “C/CE” key to return to the normal operations of the BA II+.
7. You will have a “BGN” text string in the upper right area of the display while in this mode.

Recomputing the example as an annuity due should result in a value -8,207.6209.

The steps of 1 through 6 are “toggles”. Accomplishing them again should result in a “BGN” in step 2 and “END” in step 5.

### Other BA II+ Functions

There are other BA II+ functions explained in the Texas Instrument BA II Plus manuals and documents. Some of these include the determination of the present value of a bond issue through a single math function, net present value, internal rate of return, depreciation functions, and breakeven points.