

Appendixes

Appendix A. Cumulative (Lower Tail) Areas of the Normal Distribution Function

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
- .0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
- .1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
- .2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
- .3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
- .4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
- .5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
- .6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
- .7	.2420	.2389	.2358	.2327	.2297	.2266	.2236	.2206	.2177	.2148
- .8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
- .9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
- 1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
- 1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
- 1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.09853
- 1.3	.09680	.09510	.09342	.09176	.09012	.08851	.08691	.08534	.08379	.08226
- 1.4	.08076	.07927	.07780	.07636	.07493	.07353	.07215	.07078	.06944	.06811
- 1.5	.06681	.06552	.06426	.06301	.06178	.06057	.05938	.05821	.05705	.05592
- 1.6	.05480	.05370	.05262	.05155	.05050	.04947	.04846	.04746	.04648	.04551
- 1.7	.04457	.04363	.04272	.04182	.04093	.04006	.03920	.03836	.03754	.03673
- 1.8	.03593	.03515	.03438	.03362	.03288	.03216	.03144	.03074	.03005	.02938
- 1.9	.02872	.02807	.02743	.02680	.02619	.02559	.02500	.02442	.02385	.02330
- 2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
- 2.1	.01786	.01743	.01700	.01659	.01618	.01578	.01539	.01500	.01463	.01426
- 2.2	.01390	.01355	.01321	.01287	.01255	.01222	.01191	.01160	.01130	.01101
- 2.3	.01072	.01044	.01017	.009903	.009642	.009387	.009137	.008894	.008656	.008424
- 2.4	.008198	.007976	.007760	.007549	.007344	.007143	.006947	.006756	.006569	.006387
- 2.5	.006210	.006037	.005868	.005703	.005543	.005386	.005234	.005085	.004940	.004799
- 2.6	.004661	.004527	.004396	.004269	.004145	.004025	.003907	.003793	.003681	.003573
- 2.7	.003467	.003364	.003264	.003167	.003072	.002980	.002890	.002803	.002718	.002635
- 2.8	.002555	.002477	.002401	.002327	.002256	.002186	.002118	.002052	.001988	.001926
- 2.9	.001866	.001807	.001750	.001695	.001641	.001589	.001538	.001489	.001441	.001395
- 3.0	.001350	.001306	.001264	.001223	.001183	.001144	.001107	.001070	.001035	.001001

Source: W. S. Peters and G. W. Summers, *Statistical Analysis for Business Decisions* (Englewood Cliffs, N. J.: Prentice Hall, 1968), pp. 466-69.

(continued)

Appendix A (cont.). Cumulative (Lower Tail) Areas of the Normal Distribution Function.

<i>z</i>	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.1	.09676	.09354	.09043	.08740	.08447	.08164	.07888	.07622	.07364	.07114
-3.2	.06871	.06637	.06410	.06190	.05976	.05770	.05571	.05377	.05190	.05009
-3.3	.04834	.04665	.04501	.04342	.04189	.04041	.03897	.03758	.03624	.03495
-3.4	.03369	.03248	.03131	.03018	.02909	.02803	.02701	.02602	.02507	.02415
-3.5	.02326	.02241	.02158	.02078	.02001	.01926	.01854	.01785	.01718	.01653
-3.6	.01591	.01531	.01473	.01417	.01363	.01311	.01261	.01213	.01166	.01121
-3.7	.01078	.01036	.09961	.09874	.09781	.09682	.09578	.09469	.09354	.09234
-3.8	.07235	.06948	.06673	.06407	.06152	.05906	.05669	.05442	.05223	.05012
-3.9	.04810	.04615	.04427	.04247	.04074	.03908	.03747	.03594	.03446	.03304
-4.0	.03167	.03036	.02910	.02789	.02673	.02561	.02454	.02351	.02252	.02157
-4.1	.02066	.01978	.01894	.01814	.01737	.01662	.01591	.01523	.01458	.01395
-4.2	.01335	.01277	.01222	.01168	.01118	.01069	.01022	.09774	.09345	.08934
-4.3	.08540	.08163	.07801	.07455	.07124	.06807	.06503	.06212	.05934	.05668
-4.4	.05413	.05169	.04935	.04712	.04498	.04294	.04098	.03911	.03732	.03561
-4.5	.03398	.03241	.03092	.02949	.02813	.02682	.02558	.02439	.02325	.02216
-4.6	.02112	.02013	.01919	.01828	.01742	.01660	.01581	.01506	.01434	.01366
-4.7	.01301	.01239	.01179	.01123	.01069	.01017	.09680	.09211	.08765	.08339
-4.8	.07933	.07547	.07178	.06827	.06492	.06173	.05869	.05580	.05304	.05042
-4.9	.04792	.04454	.04111	.03766	.03422	.03079	.02746	.02424	.02112	.01810
0	.50000	.50400	.50800	.51200	.51600	.51999	.52399	.52799	.53199	.53599
.1	.53980	.54380	.54780	.55170	.55570	.55960	.56360	.56750	.57140	.57530
.2	.57930	.58320	.58710	.59100	.59480	.59870	.60260	.60640	.61030	.61410
.3	.61790	.62170	.62550	.62930	.63310	.63680	.64060	.64430	.64800	.65170
.4	.65540	.65910	.66280	.66640	.67000	.67360	.67720	.68080	.68440	.68790
.5	.69150	.69500	.69850	.70190	.70540	.70880	.71230	.71570	.71900	.72240
.6	.72570	.72910	.73240	.73570	.73890	.74220	.74540	.74860	.75170	.75490
.7	.75800	.76110	.76420	.76730	.77030	.77340	.77640	.77940	.78230	.78520
.8	.78810	.79100	.79390	.79670	.79950	.80230	.80510	.80780	.81060	.81330
.9	.81590	.81860	.82120	.82380	.82640	.82890	.83150	.83400	.83650	.83890
1.0	.84130	.84380	.84610	.84850	.85080	.85310	.85540	.85770	.85990	.86210
1.1	.86430	.86650	.86860	.87080	.87290	.87490	.87700	.87900	.88100	.88300
1.2	.88490	.88690	.88880	.89070	.89250	.89440	.89620	.89800	.89970	.90140
1.3	.90320	.90490	.90658	.90824	.90988	.91149	.91309	.91466	.91621	.91774
1.4	.91924	.92073	.92220	.92364	.92507	.92647	.92785	.92922	.93056	.93189

1.5	93319	93448	93699	93822	93943	94062	94179	94295	94408
1.6	94520	94630	94845	94950	95053	95154	95254	95352	95449
1.7	95543	95728	95818	95907	95994	96080	96164	96246	96327
1.8	96407	96485	96638	96712	96784	96856	96926	96995	97062
1.9	97128	97193	97257	97320	97381	97441	97500	97558	97670
2.0	97725	97778	97882	97932	97982	98030	98077	98124	98169
2.1	98214	98257	98300	98341	98382	98422	98461	98500	98574
2.2	98610	98645	98679	98713	98745	98778	98809	98840	98899
2.3	98928	98956	98983	99009	99035	99061	99086	991106	991576
2.4	991802	992024	992240	992451	992656	992857	993053	993244	993431
2.5	993790	993963	994132	994297	994457	994614	994766	994915	995201
2.6	995339	995473	995604	995731	995855	995975	996093	996207	996319
2.7	996533	996636	996736	996833	996928	997020	997110	997197	997282
2.8	997445	997523	997599	997673	997744	997814	997882	997948	998074
2.9	998134	998193	998250	998305	998359	998411	998462	998511	998559
3.0	998650	998694	998736	998777	998817	998856	998893	998930	998965
3.1	999324	999646	999957	9991260	9991553	9991836	9992112	9992378	9992886
3.2	993129	993363	993590	993810	994024	994230	994429	994623	994810
3.3	995166	995335	995499	995658	995811	995959	996103	996242	996505
3.4	996631	996752	996869	996982	997091	997197	997299	997398	997585
3.5	997674	997759	997842	997922	997999	998074	998146	998215	998347
3.6	998409	998469	998527	998583	998637	998689	998739	998787	998834
3.7	998922	998964	9990039	9990426	9990799	9991158	9991504	9991838	9992159
3.8	992765	993052	993327	993593	993848	994094	994331	994558	994777
3.9	995190	995385	995573	995753	995926	996092	996253	996406	996554
4.0	996833	996964	997090	997211	997327	997439	997546	997649	997748
4.1	997934	998022	998106	998186	998263	998338	998409	998477	998542
4.2	998665	998723	998778	998832	998882	998931	998978	9990226	9990655
4.3	991460	991837	992199	992545	992876	993193	993497	993788	994066
4.4	994587	994831	995065	995288	995502	995706	995902	996268	996439
4.5	996602	996759	996908	997051	997187	997318	997442	997561	997784
4.6	997003	997987	998081	998172	998258	998340	998419	998494	998566
4.7	998679	998761	998821	998931	999031	999131	999230	999320	999419
4.8	992067	992453	992822	993173	993508	993827	994131	994420	994696
4.9	995208	995446	995673	995889	996094	996289	996475	996652	996821

Source: W. S. Petrus and G. W. Summers, *Statistical Analysis for Business Decisions* (Englewood Cliffs, N.J.: Prentice Hall, 1968), pp. 466-69.

Appendix B. Percentiles of the Chi-Square Distribution.

m	P	Probability in Per Cent									
		0.05	0.1	0.5	1.0	2.5	5.0	10.0	20.0	30.0	40.0
1		.00393	.0157	.0393	.0157	.0982	.0393	.0158	.0642	.148	.275
2		.0100	.0200	.0100	.0201	.0506	.103	.211	.446	.713	1.02
3		.0153	.0243	.0717	.115	.216	.352	.584	1.00	1.42	1.87
4		.0639	.908	.207	.297	.484	.711	1.06	1.65	2.19	2.75
5		.158	.210	.412	.554	.831	1.15	1.61	2.34	3.00	3.66
6		.299	.381	.676	.872	1.24	1.64	2.20	3.07	3.83	4.57
7		.485	.598	.989	1.24	1.69	2.17	2.83	3.82	4.67	5.49
8		.710	.857	1.34	1.65	2.18	2.73	3.49	4.59	5.53	6.42
9		.972	1.15	1.73	2.09	2.70	3.33	4.17	5.38	6.39	7.36
10		1.26	1.48	2.16	2.56	3.25	3.94	4.87	6.18	7.27	8.30
11		1.59	1.83	2.60	3.05	3.82	4.57	5.58	6.99	8.15	9.24
12		1.93	2.21	3.07	3.57	4.40	5.23	6.30	7.81	9.03	10.2
13		2.31	2.62	3.57	4.11	5.01	5.89	7.04	8.63	9.93	11.1
14		2.70	3.04	4.07	4.66	5.63	6.57	7.79	9.47	10.8	12.1
15		3.11	3.48	4.60	5.23	6.26	7.26	8.55	10.3	11.7	13.0
16		3.54	3.94	5.14	5.81	6.91	7.96	9.31	11.2	12.6	14.0
17		3.98	4.42	5.70	6.41	7.56	8.67	10.1	12.0	13.5	14.9
18		4.44	4.90	6.26	7.01	8.23	9.39	10.9	12.9	14.4	15.9

19	4.91	5.41	6.84	7.63	8.91	10.1	11.7	13.7	15.4	16.9
20	5.40	5.92	7.43	8.26	9.59	10.9	12.4	14.6	16.3	17.8
21	5.90	6.45	8.03	8.90	10.3	11.6	13.2	15.4	17.2	18.8
22	6.40	6.98	8.64	9.54	11.0	12.3	14.0	16.3	18.1	19.7
23	6.92	7.53	9.26	10.2	11.7	13.1	14.8	17.2	19.0	20.7
24	7.45	8.08	9.89	10.9	12.4	13.8	15.7	18.1	19.9	21.7
25	7.99	8.65	10.5	11.5	13.1	14.6	16.5	18.9	20.9	22.6
26	8.54	9.22	11.2	12.2	13.8	15.4	17.3	19.8	21.8	23.6
27	9.09	9.80	11.8	12.9	14.6	16.2	18.1	20.7	22.7	24.5
28	9.66	10.4	12.5	13.6	15.3	16.9	18.9	21.6	23.6	25.5
29	10.2	11.0	13.1	14.3	16.0	17.7	19.8	22.5	24.6	26.5
30	10.8	11.6	13.8	15.0	16.8	18.5	20.6	23.4	25.5	27.4
40	16.9	17.9	20.7	22.2	24.4	26.5	29.1	32.3	34.9	37.1
50	23.5	24.7	28.0	29.7	32.4	34.8	37.7	41.4	44.3	46.9
60	30.3	31.7	35.5	37.5	40.5	43.2	46.5	50.6	53.8	56.6
70	37.5	39.0	43.3	45.4	48.8	51.7	55.3	59.9	63.3	66.4
80	44.8	46.5	51.2	53.5	57.2	60.4	64.3	69.2	72.9	76.2
90	52.3	54.2	59.2	61.8	65.6	69.1	73.3	78.6	82.5	86.0
100	59.9	61.9	67.3	70.1	74.2	77.9	82.4	87.1	92.1	95.8

Source: W. S. Peters and G. W. Summers, *Statistical Analysis for Business Decisions* (Englewood Cliffs, N.J.: Prentice Hall, 1968), pp. 470-73.

Appendix B. (cont.) Percentiles of the Chi-Square Distribution.

m	P	Probability in Per Cent										
		50.0	60.0	70.0	80.0	90.0	95.0	97.5	99.0	99.5	99.9	99.95
1	.455		.708	1.07	1.64	2.71	3.84	5.02	6.63	7.88	10.8	12.1
2	1.39	1.83	2.41	3.22	4.61	5.99	7.38	9.21	10.6	13.8	15.2	17.7
3	2.37	2.95	3.67	4.64	6.25	7.81	9.35	11.3	12.8	16.3	17.7	20.0
4	3.36	4.04	4.88	5.99	7.78	9.49	11.1	13.3	14.9	18.5	20.5	22.1
5	4.35	5.13	6.06	7.29	9.24	11.1	12.8	15.1	16.7	20.5	22.5	24.1
6	5.35	6.21	7.23	8.56	10.6	12.6	14.4	16.8	18.5	22.5	24.3	26.0
7	6.35	7.28	8.38	9.80	12.0	14.1	16.0	18.5	20.3	24.3	26.1	27.9
8	7.34	8.35	9.52	11.0	13.4	15.5	17.5	20.1	22.0	26.1	27.9	29.7
9	8.34	9.41	10.7	12.2	14.7	16.9	19.0	21.7	23.6	27.9	29.7	31.4
10	9.34	10.5	11.8	13.4	16.0	18.3	20.5	23.2	25.2	29.6	31.4	33.1
11	10.3	11.5	12.9	14.6	17.3	19.7	21.9	24.7	26.8	31.3	32.9	34.8
12	11.3	12.6	14.0	15.8	18.5	21.0	23.3	26.2	28.3	32.9	34.5	36.5
13	12.3	13.6	15.1	17.0	19.8	22.4	24.7	27.7	29.8	34.5	36.1	38.1
14	13.3	14.7	16.2	18.2	21.1	23.7	26.1	29.1	31.3	36.1	37.7	39.7
15	14.3	15.7	17.3	19.3	22.3	25.0	27.5	30.6	32.8	37.7	39.3	41.3
16	15.3	16.8	18.4	20.5	23.5	26.3	28.8	32.0	34.3	39.3	40.8	42.9
17	16.3	17.8	19.5	21.6	24.8	27.6	30.2	33.4	35.7	40.8	42.9	

18	17.3	18.9	20.6	22.8	26.0	28.9	31.5	34.8	37.2	42.3	44.4
19	18.3	19.9	21.7	23.9	27.2	30.1	32.9	36.2	38.6	43.8	46.0
20	19.3	21.0	22.8	25.0	28.4	31.4	34.2	37.6	40.0	45.3	47.5
21	20.3	22.0	23.9	26.2	29.6	32.7	35.5	38.9	41.4	46.8	49.0
22	21.3	23.0	24.9	27.3	30.8	33.9	36.8	40.3	42.8	48.3	50.5
23	22.3	24.1	26.0	28.4	32.0	35.2	38.1	41.6	44.2	49.7	52.0
24	23.3	25.1	27.1	29.6	33.2	36.4	39.4	43.0	45.6	51.2	53.5
25	24.3	26.1	28.2	30.7	34.4	37.7	40.6	44.3	46.9	52.6	54.9
26	25.3	27.2	29.2	31.8	35.6	38.9	41.9	45.6	48.3	54.1	56.4
27	26.3	28.2	30.3	32.9	36.7	40.1	43.2	47.0	49.6	55.5	57.9
28	27.3	29.2	31.4	34.0	37.9	41.3	44.5	48.3	51.0	56.9	59.3
29	28.3	30.3	32.5	35.1	39.1	42.6	45.7	49.6	52.3	58.3	60.7
30	29.3	31.3	33.5	36.3	40.3	43.8	47.0	50.9	53.7	59.7	62.2
40	39.3	41.6	44.2	47.3	51.8	55.8	59.3	63.7	66.8	73.4	76.1
50	49.3	51.9	54.7	58.2	63.2	67.5	71.4	76.2	79.5	86.7	89.6
60	59.3	62.1	65.2	69.0	74.4	79.1	83.3	84.4	92.0	99.6	102.7
70	69.3	72.4	75.7	79.7	85.5	90.5	95.0	100.4	104.2	112.3	115.6
80	79.3	82.6	86.1	90.4	96.6	101.9	106.6	112.3	116.3	124.8	128.3
90	89.3	92.8	96.5	101.1	107.6	113.1	111.1	124.1	128.3	137.2	140.8
100	99.3	102.9	106.9	111.7	118.5	124.3	129.6	135.8	140.2	149.4	153.2

Source: W. S. Peters and G. W. Summers, *Statistical Analysis for Business Decisions* (Englewood Cliffs, N.J.: Prentice Hall, 1968), pp. 470-73.

Appendix C: Percentiles of the *t* Distribution.*

<i>m</i>	<i>t</i> _{.60}	<i>t</i> _{.70}	<i>t</i> _{.80}	<i>t</i> _{.90}	<i>t</i> _{.95}	<i>t</i> _{.975}	<i>t</i> _{.99}	<i>t</i> _{.995}
1	.325	.727	1.376	3.078	6.314	12.706	31.821	63.657
2	.289	.617	1.061	1.886	2.920	4.303	5.965	9.925
3	.277	.584	.978	1.638	2.353	3.182	4.541	5.841
4	.271	.569	.941	1.533	2.132	2.776	3.747	4.604
5	.267	.559	.920	1.476	2.015	2.571	3.365	4.032
6	.265	.553	.906	1.440	1.943	2.447	3.143	3.707
7	.263	.549	.896	1.415	1.895	2.365	2.998	3.499
8	.262	.546	.889	1.397	1.860	2.306	2.896	3.355
9	.261	.543	.883	1.383	1.833	2.262	2.821	3.250
10	.260	.542	.879	1.372	1.812	2.228	2.764	3.169
11	.260	.540	.876	1.363	1.796	2.201	2.718	3.106
12	.259	.539	.873	1.356	1.782	2.179	2.681	3.055
13	.259	.538	.870	1.350	1.771	2.160	2.650	3.012
14	.258	.537	.868	1.345	1.761	2.145	2.624	2.977
15	.258	.536	.866	1.341	1.753	2.131	2.602	2.947
16	.258	.535	.865	1.337	1.746	2.120	2.583	2.921
17	.257	.534	.863	1.333	1.740	2.110	2.567	2.898
18	.257	.534	.862	1.330	1.734	2.101	2.552	2.878