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OF

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and Related Topics

Second Edition

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SEYMOUR LIPSCHUTZ, who is presently on the mathematics faculty of Temple University, formerly taught at the Polytechnic Institute of Brooklyn and was visiting professor in the Computer Science Department of Brooklyn College. He received his Ph.D. in 1960 at the Courant Institute of Mathematical Sciences of New York University. Some of his other books in the Schaum's Outline Series are *Beginning Linear Algebra*; *Discrete Mathematics, 2nd ed.*; *Probability*; and *Linear Algebra, 2nd ed.*

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Preface

The theory of sets lies at the foundations of mathematics. Concepts in set theory, such as functions and relations, appear explicitly or implicitly in every branch of mathematics. These concepts also appear in many related fields such as computer science, the physical sciences, and engineering. This text is an informal, nonaxiomatic treatment of the theory of sets.

The material is divided into three Parts, since the logical development is thereby not disturbed while the usefulness as a text and reference book on any of several levels is increased. Part I contains an introduction to the elementary operations of sets and a detailed discussion of the concepts of relation and function. Part II develops the theory of cardinal and ordinal numbers in the classical approach of Cantor. It also considers partially ordered sets, and the Axiom of Choice and its equivalents including Zorn's lemma. Part III treats those topics which are usually associated with the elementary theory of sets, that is, logic and Boolean algebra.

This second edition of *Set Theory* covers more material than the first edition. In particular, it includes a deeper discussion of the real numbers **R** and a more complete discussion of the integers **Z**. Furthermore, it includes a discussion of algorithms and their complexity in the chapter on functions, and it includes new material, including Karnaugh maps, in the chapter on Boolean algebra.

Each chapter begins with clear statements of pertinent definitions, principles, and theorems together with illustrative and other descriptive material. This is followed by graded sets of solved and supplementary problems. The solved problems serve to illustrate and amplify the theory, bring into sharp focus those fine points without which the student continually feels himself on unsafe ground, and provide the repetition of basic principles so vital to effective learning. Numerous proofs of theorems and derivations of basic results are included among the solved problems. The supplementary problems serve as a complete review of each chapter.

Finally, the author wishes to thank the staff of the McGraw-Hill Schaum's Outline Series, especially Barbara Gilson, Mary Loebig Giles, and Maureen Walker, for their excellent cooperation.

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Contents