

Mathematical Logic Undergraduate Texts In Mathematics

The aim of this book is to present mathematical logic to students who are interested in what this field is but have no intention of specializing in it. The point of view is to treat logic on an equal footing to any other topic in the mathematical curriculum. The book starts with a presentation of naive set theory, the theory of sets that mathematicians use on a daily basis. Each subsequent chapter presents one of the main areas of mathematical logic: first order logic and formal proofs, model theory, recursion theory, Gödel's incompleteness theorem, and, finally, the axiomatic set theory. Each chapter includes several interesting highlights—outside of logic when possible—either in the main text, or as exercises or appendices. Exercises are an essential component of the book, and a good number of them are designed to provide an opening to additional topics of interest.

This is a short, modern, and motivated introduction to mathematical logic for upper undergraduate and beginning graduate students in mathematics and computer science. Any mathematician who is interested in getting acquainted with logic and would like to learn Gödel's incompleteness theorems should find this book particularly useful. The treatment is thoroughly mathematical and prepares students to branch out in several areas of mathematics related to foundations and computability, such as logic, axiomatic set theory, model theory, recursion theory, and computability. In this new edition, many small and large changes have been made throughout the text. The main purpose of this new edition is to provide a healthy first introduction to model theory, which is a very important branch of logic. Topics in the new chapter include ultraproduct of models, elimination of quantifiers, types, applications of types to model theory, and applications to algebra, number theory and geometry. Some proofs, such as the proof of the very important completeness theorem, have been completely rewritten in a more clear and concise manner. The new edition also introduces new topics, such as the notion of elementary class of structures, elementary diagrams, partial elementary maps, homogeneous structures, definability, and many more.

This comprehensive overview of mathematical logic is designed primarily for advanced undergraduates and graduate students of mathematics. The treatment also contains much of interest to advanced students in computer science and philosophy. Topics include propositional logic; first-order languages and logic; incompleteness, undecidability, and indefinability; recursive functions; computability; and Hilbert's Tenth Problem. Reprint of the PWS Publishing Company, Boston, 1995 edition.

New corrected printing of a well-established text on logic at the introductory level.

This book was written to serve as an introduction to logic, with in each chapter – if applicable – special emphasis on the interplay between logic and philosophy, mathematics, language and (theoretical) computer science. The reader will not only be provided with an introduction to classical logic, but to philosophical (modal, epistemic, deontic, temporal) and intuitionistic logic as well. The first chapter is an easy to read non-technical Introduction to the topics in the book. The next chapters are consecutively about Propositional Logic, Sets (finite and infinite), Predicate Logic, Arithmetic and Gödel's Incompleteness Theorems, Modal Logic, Philosophy of Language, Intuitionism and Intuitionistic Logic, Applications (Prolog; Relational Databases and SQL; Social Choice Theory, in particular Majority Judgment) and finally, Fallacies and Unfair Discussion Methods. Throughout the text, the author provides some impressions of the historical development of logic: Stoic and Aristotelian logic, logic in the Middle Ages and Frege's Begriffsschrift, together with the works of George Boole (1815-1864) and August De Morgan (1806-1871), the origin of modern logic. Since "if ..., then ..." can be considered to be the heart of logic, throughout this book much attention is paid to conditionals: material, strict and relevant implication, entailment, counterfactuals and conversational implicature are treated and many references for further reading are given. Each chapter is concluded with answers to the exercises. Philosophical and Mathematical Logic is a very recent book (2018), but with every aspect of a classic. What a wonderful book! Work written with all the necessary rigor, with immense depth, but without giving up clarity and good taste. Philosophy and mathematics go hand in hand with the most diverse themes of logic. An introductory text, but not only that. It goes much further. It's worth diving into the pages of this book, dear reader! Paulo Sérgio Argolo

A Mathematical Introduction to Logic, Second Edition, offers increased flexibility with topic coverage, allowing for choice in how to utilize the textbook in a course. The author has made this edition more accessible to better meet the needs of today's undergraduate mathematics and philosophy students. It is intended for the reader who has not studied logic previously, but who has some experience in mathematical reasoning. Material is presented on computer science issues such as computational complexity and database queries, with additional coverage of introductory material such as sets. * Increased flexibility of the text, allowing instructors more choice in how they use the textbook in courses. * Reduced mathematical rigour to fit the needs of undergraduate students

This accessible textbook gives beginning undergraduate mathematics students a first exposure to introductory logic, proofs, sets, functions, number theory, relations, finite and infinite sets, and the foundations of analysis. The book provides students with a quick path to writing proofs and a practical collection of tools that they can use in later mathematics courses such as abstract algebra and analysis. The importance of the logical structure of a mathematical statement as a framework for finding a proof of that statement, and the proper use of variables, is an early and consistent theme used throughout the book.

This introduction to first-order logic clearly works out the role of first-order logic in the foundations of mathematics, particularly the two basic questions of the range of the axiomatic method and of theorem-proving by machines. It covers several advanced topics not commonly treated in introductory texts, such as Fraïssé's characterization of elementary equivalence, Lindström's theorem on the maximality of first-order logic, and the fundamentals of logic programming.

This textbook is a logic manual which includes an elementary course and an advanced course. It covers more than most introductory logic textbooks, while maintaining a comfortable pace that students can follow. The technical exposition is clear, precise and follows a paced increase in complexity, allowing the reader to get comfortable with previous definitions and procedures before facing more difficult material. The book also presents an interesting overall balance between formal and philosophical discussion, making it suitable for both philosophy and more formal/science oriented students. This textbook is of great use to undergraduate philosophy students, graduate philosophy students, logic teachers, undergraduates and graduates in mathematics, computer science or related fields in which logic is required.

" This book presents reverse mathematics to a general mathematical audience for the first time. Reverse mathematics is a new field that answers some old questions. In the two thousand years that mathematicians have been deriving theorems from axioms, it has often been asked: which axioms are needed to prove a given theorem? Only in the last two

hundred years have some of these questions been answered, and only in the last forty years has a systematic approach been developed. In *Reverse Mathematics*, John Stillwell gives a representative view of this field, emphasizing basic analysis--finding the "right axioms" to prove fundamental theorems--and giving a novel approach to logic. Stillwell introduces reverse mathematics historically, describing the two developments that made reverse mathematics possible, both involving the idea of arithmetization. The first was the nineteenth-century project of arithmetizing analysis, which aimed to define all concepts of analysis in terms of natural numbers and sets of natural numbers. The second was the twentieth-century arithmetization of logic and computation. Thus arithmetic in some sense underlies analysis, logic, and computation. Reverse mathematics exploits this insight by viewing analysis as arithmetic extended by axioms about the existence of infinite sets. Remarkably, only a small number of axioms are needed for reverse mathematics, and, for each basic theorem of analysis, Stillwell finds the "right axiom" to prove it. By using a minimum of mathematical logic in a well-motivated way, *Reverse Mathematics* will engage advanced undergraduates and all mathematicians interested in the foundations of mathematics. "--

Using a unique pedagogical approach, this text introduces mathematical logic by guiding students in implementing the underlying logical concepts and mathematical proofs via Python programming. This approach, tailored to the unique intuitions and strengths of the ever-growing population of programming-savvy students, brings mathematical logic into the comfort zone of these students and provides clarity that can only be achieved by a deep hands-on understanding and the satisfaction of having created working code. While the approach is unique, the text follows the same set of topics typically covered in a one-semester undergraduate course, including propositional logic and first-order predicate logic, culminating in a proof of Gödel's completeness theorem. A sneak peek to Gödel's incompleteness theorem is also provided. The textbook is accompanied by an extensive collection of programming tasks, code skeletons, and unit tests. Familiarity with proofs and basic proficiency in Python is assumed.

This logically self-contained introduction to analysis centers around those properties that have to do with uniform convergence and uniform limits in the context of differentiation and integration. From the reviews: "This material can be gone over quickly by the really well-prepared reader, for it is one of the book's pedagogical strengths that the pattern of development later recapitulates this material as it deepens and generalizes it." --AMERICAN MATHEMATICAL SOCIETY
Mathematical logic is a branch of mathematics that takes axiom systems and mathematical proofs as its objects of study. This book shows how it can also provide a foundation for the development of information science and technology. The first five chapters systematically present the core topics of classical mathematical logic, including the syntax and models of first-order languages, formal inference systems, computability and representability, and Gödel's theorems. The last five chapters present extensions and developments of classical mathematical logic, particularly the concepts of version sequences of formal theories and their limits, the system of revision calculus, proschemes (formal descriptions of proof methods and strategies) and their properties, and the theory of inductive inference. All of these themes contribute to a formal theory of axiomatization and its application to the process of developing information technology and scientific theories. The book also describes the paradigm of three kinds of language environments for theories and it presents the basic properties required of a meta-language environment. Finally, the book brings these themes together by describing a workflow for scientific research in the information era in which formal methods, interactive software and human invention are all used to their advantage. This book represents a valuable reference for graduate and undergraduate students and researchers in mathematics, information science and technology, and other relevant areas of natural sciences. Its first five chapters serve as an undergraduate text in mathematical logic and the last five chapters are addressed to graduate students in relevant disciplines.

The aim of this book is to help students write mathematics better. Throughout it are large exercise sets well-integrated with the text and varying appropriately from easy to hard. Basic issues are treated, and attention is given to small issues like not placing a mathematical symbol directly after a punctuation mark. And it provides many examples of what students should think and what they should write and how these two are often not the same.

Imre Lakatos's *Proofs and Refutations* is an enduring classic, which has never lost its relevance. Taking the form of a dialogue between a teacher and some students, the book considers various solutions to mathematical problems and, in the process, raises important questions about the nature of mathematical discovery and methodology. Lakatos shows that mathematics grows through a process of improvement by attempts at proofs and critiques of these attempts, and his work continues to inspire mathematicians and philosophers aspiring to develop a philosophy of mathematics that accounts for both the static and the dynamic complexity of mathematical practice. With a specially commissioned Preface written by Paolo Mancosu, this book has been revived for a new generation of readers.

Mathematical logic developed into a broad discipline with many applications in mathematics, informatics, linguistics and philosophy. This text introduces the fundamentals of this field, and this new edition has been thoroughly expanded and revised.

This book, based on Pólya's method of problem solving, aids students in their transition to higher-level mathematics. It begins by providing a great deal of guidance on how to approach definitions, examples, and theorems in mathematics and ends by providing projects for independent study. Students will follow Pólya's four step process: learn to understand the problem; devise a plan to solve the problem; carry out that plan; and look back and check what the results told them.

Undergraduate students with no prior instruction in mathematical logic will benefit from this multi-part text. Part I offers an elementary but thorough overview of mathematical logic of 1st order. Part II introduces some of the newer ideas and the more profound results of logical research in the 20th century. 1967 edition.

Combining stories of great writers and philosophers with quotations and riddles, this completely original text for first courses in mathematical logic examines problems related to proofs, propositional logic and first-order logic, undecidability, and other topics.

2013 edition.

A mathematical introduction to the theory and applications of logic and set theory with an emphasis on writing proofs. Highlighting the applications and notations of basic mathematical concepts within the framework of logic and set theory, *A First Course in Mathematical Logic and Set Theory* introduces how logic is used to prepare and structure proofs and solve more complex problems. The book begins with propositional logic, including two-column proofs and truth table applications, followed by first-order logic, which provides the structure for writing mathematical proofs. Set theory is then introduced and serves as the basis for defining relations, functions, numbers, mathematical induction, ordinals, and cardinals. The book concludes with a primer on basic model theory with applications to abstract algebra. *A First Course in Mathematical Logic and Set Theory* also includes: Section exercises designed to show the interactions between topics and reinforce the presented ideas and concepts. Numerous examples that illustrate theorems and employ basic concepts such as Euclid's lemma, the Fibonacci sequence, and unique factorization. Coverage of important theorems including the well-ordering theorem, completeness theorem, compactness theorem, as well as the theorems of Löwenheim–Skolem, Burali-Forti, Hartogs, Cantor–Schröder–Bernstein, and König. An excellent textbook for students studying the foundations of mathematics and mathematical proofs, *A First Course in Mathematical Logic and Set Theory* is also appropriate for readers preparing for careers in mathematics education or computer science. In addition, the book is ideal for introductory courses on mathematical logic and/or set theory and appropriate for upper-undergraduate transition courses with rigorous mathematical reasoning involving algebra, number theory, or analysis.

This undergraduate textbook covers the key material for a typical first course in logic, in particular presenting a full mathematical account of the most important result in logic, the Completeness Theorem for first-order logic. Looking at a series of interesting systems, increasing in complexity, then proving and discussing the Completeness Theorem for each, the author ensures that the number of new concepts to be absorbed at each stage is manageable, whilst providing lively mathematical applications throughout. Unfamiliar terminology is kept to a minimum, no background in formal set-theory is required, and the book contains proofs of all the required set theoretical results. The reader is taken on a journey starting with König's Lemma, and progressing via order relations, Zorn's Lemma, Boolean algebras, and propositional logic, to completeness and compactness of first-order logic. As applications of the work on first-order logic, two final chapters provide introductions to model theory and nonstandard analysis. This book, presented in two parts, offers a slow introduction to mathematical logic, and several basic concepts of model theory, such as first-order definability, types, symmetries, and elementary extensions. Its first part, *Logic Sets, and Numbers*, shows how mathematical logic is used to develop the number structures of classical mathematics. The exposition does not assume any prerequisites; it is rigorous, but as informal as possible. All necessary concepts are introduced exactly as they would be in a course in mathematical logic; but are accompanied by more extensive introductory remarks and examples to motivate formal developments. The second part, *Relations, Structures, Geometry*, introduces several basic concepts of model theory, such as first-order definability, types, symmetries, and elementary extensions, and shows how they are used to study and classify mathematical structures. Although more advanced, this second part is accessible to the reader who is either already familiar with basic mathematical logic, or has carefully read the first part of the book. Classical developments in model theory, including the Compactness Theorem and its uses, are discussed. Other topics include tameness, minimality, and order minimality of structures. The book can be used as an introduction to model theory, but unlike standard texts, it does not require familiarity with abstract algebra. This book will also be of interest to mathematicians who know the technical aspects of the subject, but are not familiar with its history and philosophical background.

1. This book is above all addressed to mathematicians. It is intended to be a textbook of mathematical logic on a sophisticated level, presenting the reader with several of the most significant discoveries of the last ten or fifteen years. These include: the independence of the continuum hypothesis, the Diophantine nature of enumerable sets, the impossibility of finding an algorithmic solution for one or two old problems. All the necessary preliminary material, including predicate logic and the fundamentals of recursive function theory, is presented systematically and with complete proofs. We only assume that the reader is familiar with "naive" set theoretic arguments. In this book mathematical logic is presented both as a part of mathematics and as the result of its self-perception. Thus, the substance of the book consists of difficult proofs of subtle theorems, and the spirit of the book consists of attempts to explain what these theorems say about the mathematical way of thought. Foundational problems are for the most part passed over in silence. Most likely, logic is capable of justifying mathematics to no greater extent than biology is capable of justifying life.

2. The first two chapters are devoted to predicate logic. The presentation here is fairly standard, except that semantics occupies a very dominant position, truth is introduced before deducibility, and models of speech in formal languages precede the systematic study of syntax.

This is a compact introduction to some of the principal topics of mathematical logic. In the belief that beginners should be exposed to the most natural and easiest proofs, I have used free-swinging set-theoretic methods. The significance of a demand for constructive proofs can be evaluated only after a certain amount of experience with mathematical logic has been obtained. If we are to be expelled from "Cantor's paradise" (as nonconstructive set theory was called by Hilbert), at least we should know what we are missing. The major changes in this new edition are the following. (1) In Chapter 5, Effective Computability, Turing-computability is now the central notion, and diagrams (flow-charts) are used to construct Turing machines. There are also treatments of Markov algorithms, Herbrand-Gödel-computability, register machines, and random access machines. Recursion theory is gone into a little more deeply, including the s-m-n theorem, the recursion theorem, and Rice's Theorem. (2) The proofs of the Incompleteness Theorems are now based upon the Diagonalization Lemma. Löb's Theorem and its connection with Gödel's Second Theorem are also studied. (3) In Chapter 2, Quantification Theory, Henkin's proof of the completeness theorem has been postponed until the reader has gained more experience in proof techniques. The exposition of the proof itself has been improved by breaking it down into smaller pieces and using the notion of a scapegoat theory. There is also an entirely new section on semantic trees.

This introduction to mathematical logic explores philosophical issues and Gödel's Theorem. Its widespread influence extends to the author of Gödel, Escher, Bach, whose Pulitzer Prize-winning book was inspired by this work.

Set theory, logic and category theory lie at the foundations of mathematics, and have a dramatic effect on the mathematics that we do, through the Axiom of Choice, Gödel's Theorem, and the Skolem Paradox. But they are also rich mathematical theories in their own right, contributing techniques and results to working mathematicians such as the Compactness Theorem and module categories. The book is aimed at those who know some mathematics and want to know more about its building blocks. Set theory

is first treated naively an axiomatic treatment is given after the basics of first-order logic have been introduced. The discussion is supported by a wide range of exercises. The final chapter touches on philosophical issues. The book is supported by a World Wide Web site containing a variety of supplementary material.

This book is intended as an undergraduate senior level or beginning graduate level text for mathematical logic. There are virtually no prerequisites, although a familiarity with notions encountered in a beginning course in abstract algebra such as groups, rings, and fields will be useful in providing some motivation for the topics in Part III. An attempt has been made to develop the beginning of each part slowly and then to gradually quicken the pace and the complexity of the material. Each part ends with a brief introduction to selected topics of current interest. The text is divided into three parts: one dealing with set theory, another with computable function theory, and the last with model theory. Part III relies heavily on the notation, concepts and results discussed in Part I and to some extent on Part II. Parts I and II are independent of each other, and each provides enough material for a one semester course. The exercises cover a wide range of difficulty with an emphasis on more routine problems in the earlier sections of each part in order to familiarize the reader with the new notions and methods. The more difficult exercises are accompanied by hints. In some cases significant theorems are developed step by step with hints in the problems. Such theorems are not used later in the sequence.

An introduction to applying predicate logic to testing and verification of software and digital circuits that focuses on applications rather than theory. Computer scientists use logic for testing and verification of software and digital circuits, but many computer science students study logic only in the context of traditional mathematics, encountering the subject in a few lectures and a handful of problem sets in a discrete math course. This book offers a more substantive and rigorous approach to logic that focuses on applications in computer science. Topics covered include predicate logic, equation-based software, automated testing and theorem proving, and large-scale computation. Formalism is emphasized, and the book employs three formal notations: traditional algebraic formulas of propositional and predicate logic; digital circuit diagrams; and the widely used partially automated theorem prover, ACL2, which provides an accessible introduction to mechanized formalism. For readers who want to see formalization in action, the text presents examples using Proof Pad, a lightweight ACL2 environment. Readers will not become ACL2 experts, but will learn how mechanized logic can benefit software and hardware engineers. In addition, 180 exercises, some of them extremely challenging, offer opportunities for problem solving. There are no prerequisites beyond high school algebra. Programming experience is not required to understand the book's equation-based approach. The book can be used in undergraduate courses in logic for computer science and introduction to computer science and in math courses for computer science students.

This is a systematic and well-paced introduction to mathematical logic. Excellent as a course text, the book does not presuppose any previous knowledge and can be used also for self-study by more ambitious students. Starting with the basics of set theory, induction and computability, it covers propositional and first-order logic their syntax, reasoning systems and semantics. Soundness and completeness results for Hilbert's and Gentzen's systems are presented, along with simple decidability arguments. The general applicability of various concepts and techniques is demonstrated by highlighting their consistent reuse in different contexts. Unlike in most comparable texts, presentation of syntactic reasoning systems precedes the semantic explanations. The simplicity of syntactic constructions and rules of a high, though often neglected, pedagogical value aids students in approaching more complex semantic issues. This order of presentation also brings forth the relative independence of syntax from the semantics, helping to appreciate the importance of the purely symbolic systems, like those underlying computers. An overview of the history of logic precedes the main text, in which careful presentation of concepts, results and examples is accompanied by the informal analogies and illustrations. These informal aspects are kept clearly apart from the technical ones. Together, they form a unique text which may be appreciated equally by lecturers and students occupied with mathematical precision, as well as those interested in the relations of logical formalisms to the problems of computability and the philosophy of mathematical logic.

This textbook introduces discrete mathematics by emphasizing the importance of reading and writing proofs. Because it begins by carefully establishing a familiarity with mathematical logic and proof, this approach suits not only a discrete mathematics course, but can also function as a transition to proof. Its unique, deductive perspective on mathematical logic provides students with the tools to more deeply understand mathematical methodology—an approach that the author has successfully classroom tested for decades. Chapters are helpfully organized so that, as they escalate in complexity, their underlying connections are easily identifiable. Mathematical logic and proofs are first introduced before moving onto more complex topics in discrete mathematics. Some of these topics include: Mathematical and structural induction Set theory Combinatorics Functions, relations, and ordered sets Boolean algebra and Boolean functions Graph theory Introduction to Discrete Mathematics via Logic and Proof will suit intermediate undergraduates majoring in mathematics, computer science, engineering, and related subjects with no formal prerequisites beyond a background in secondary mathematics.

At the intersection of mathematics, computer science, and philosophy, mathematical logic examines the power and limitations of formal mathematical thinking. In this expansion of Leary's user-friendly 1st edition, readers with no previous study in the field are introduced to the basics of model theory, proof theory, and computability theory. The text is designed to be used either in an upper division undergraduate classroom, or for self study. Updating the 1st Edition's treatment of languages, structures, and deductions, leading to rigorous proofs of Gödel's First and Second Incompleteness Theorems, the expanded 2nd Edition includes a new introduction to incompleteness through computability as well as solutions to selected exercises.

Contents include an elementary but thorough overview of mathematical logic of 1st order; formal number theory; surveys of the work by Church, Turing, and others, including Gödel's completeness theorem, Gentzen's theorem, more.

Assuming no previous study in logic, this informal yet rigorous text covers the material of a standard undergraduate first course in mathematical logic, using natural deduction and leading up to the completeness theorem for first-order logic. At each stage of the text, the reader is given an intuition based on standard mathematical practice, which is subsequently developed with clean formal mathematics. Alongside the practical examples, readers learn what can and can't be calculated; for example the correctness of a derivation proving a given sequent can be tested mechanically, but there is no general mechanical test for the existence of a derivation proving the given sequent. The undecidability results are proved rigorously in an optional final chapter, assuming Matiyasevich's theorem characterising the computably enumerable relations. Rigorous proofs of the adequacy and completeness proofs of the relevant logics are provided, with careful attention to the languages involved. Optional sections discuss the classification of mathematical structures by first-

order theories; the required theory of cardinality is developed from scratch. Throughout the book there are notes on historical aspects of the material, and connections with linguistics and computer science, and the discussion of syntax and semantics is influenced by modern linguistic approaches. Two basic themes in recent cognitive science studies of actual human reasoning are also introduced. Including extensive exercises and selected solutions, this text is ideal for students in Logic, Mathematics, Philosophy, and Computer Science.

This introduction to mathematical logic stresses the use of logical methods in attacking nontrivial problems. It covers the logic of classes, of propositions, of propositional functions, and the general syntax of language, with a brief introduction to so-called undecidability and incompleteness theorems; and much more. 1950 edition.

This book gives a rigorous yet 'physics-focused' introduction to mathematical logic that is geared towards natural science majors. We present the science major with a robust introduction to logic, focusing on the specific knowledge and skills that will unavoidably be needed in calculus topics and natural science topics in general (rather than taking a philosophical math fundamental oriented approach that is commonly found in mathematical logic textbooks).

Model theory begins with an audacious idea: to consider statements about mathematical structures as mathematical objects of study in their own right. While inherently important as a tool of mathematical logic, it also enjoys connections to and applications in diverse branches of mathematics, including algebra, number theory and analysis. Despite this, traditional introductions to model theory assume a graduate-level background of the reader. In this innovative textbook, Jonathan Kirby brings model theory to an undergraduate audience. The highlights of basic model theory are illustrated through examples from specific structures familiar from undergraduate mathematics, paying particular attention to definable sets throughout. With numerous exercises of varying difficulty, this is an accessible introduction to model theory and its place in mathematics.

This is a textbook for a one-term course whose goal is to ease the transition from lower-division calculus courses to upper-division courses in linear and abstract algebra, real and complex analysis, number theory, topology, combinatorics, and so on. Without such a "bridge" course, most upper division instructors feel the need to start their courses with the rudiments of logic, set theory, equivalence relations, and other basic mathematical raw materials before getting on with the subject at hand. Students who are new to higher mathematics are often startled to discover that mathematics is a subject of ideas, and not just formulaic rituals, and that they are now expected to understand and create mathematical proofs. Mastery of an assortment of technical tricks may have carried the students through calculus, but it is no longer a guarantee of academic success. Students need experience in working with abstract ideas at a nontrivial level if they are to achieve the sophisticated blend of knowledge, discipline, and creativity that we call "mathematical maturity." I don't believe that "theorem-proving" can be taught any more than "question-answering" can be taught. Nevertheless, I have found that it is possible to guide students gently into the process of mathematical proof in such a way that they become comfortable with the experience and begin asking themselves questions that will lead them in the right direction. Part I of this coherent, well-organized text deals with formal principles of inference and definition. Part II explores elementary intuitive set theory, with separate chapters on sets, relations, and functions. Ideal for undergraduates.

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