

Mordechai Ben-Ari

Mathematical Logic for Computer Science

Third Edition

 Springer

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Rosina Ehmann



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Mathematical Logic for Computer Science Mordechai Ben-Ari, 2001 This is a mathematics textbook with theorems and proofs. The choice of topics has been guided by the needs of computer science students. The method of semantic tableaux provides an elegant way to teach logic that is both theoretically sound and yet sufficiently elementary for undergraduates. In order to provide a balanced treatment of logic tableaux are related to deductive proof systems. The book presents various logical systems and contains exercises. Still further Prolog source code is available on an accompanying Web site. The author is an Associate Professor at the Department of Science Teaching Weizmann Institute of Science.

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Mathematical Logic For Computer Science Zhongwan Lu, 1989-07-01 This book describes the aspects of mathematical logic related to computer sciences. The materials adopted in this book are intended to attend to both the peculiarities of logical systems and the requirements of computer science.

Logic for Computer Scientists Uwe Schöning, 2008-01-11 This book introduces the notions and methods of formal logic from a computer science standpoint covering propositional logic, predicate logic and foundations of logic programming. The classic text is replete with illustrative examples and exercises. It presents applications and themes of computer science research such as resolution, automated deduction and logic programming in a rigorous but readable way. The style and scope of the work rounded out by the inclusion of exercises make this an excellent textbook for an advanced undergraduate course.

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Mathematical logic is essentially related to computer science This book describes the aspects of mathematical logic that are closely related to each other including classical logic constructive logic and modal logic This book is intended to attend to both the peculiarities of logical systems and the requirements of computer science In this edition the revisions essentially involve rewriting the proofs increasing the explanations and adopting new terms and notations *Mathematical Logic in Computer Science* B. Dömölki,Tamás Gergely,1981 **Mathematical Logic for Computer Science** M. Ben-Ari,2003

Mathematical Logic for Computer Science Dino Mandrioli,Paola Spoletini,2010-02-01 In the recent decades mathematical logic has become more and more important in computer science and in general in system engineering In fact by definition it is the way of expressing our reasoning in terms of mathematical formalism thus supplying it with the typical rigor and precision of mathematics Not by chance automatic information processing is now pervasive and we find it practically in any human activity and artefact from embedded safety critical systems to e commerce to social networks etc Such a pervasiveness and the consequent heterogeneity of the involved systems mandate much more generality in the formalism supporting the engineering activity than traditional specialized models such as e g those for electric circuits and mechanical engines mathematical logic paired with computer applications provides such generality Computer Science Logic Leszek Pacholski,Jerzy Tiuryn,1995-07-18 This volume contains revised refereed versions of the best papers presented during the CSL 94 conference held in Kazimierz Poland in September 1994 CSL 94 is the eighth event in the series of workshops held for the third time as the Annual Conference of the European Association for Computer Science Logic The 38 papers presented were selected from a total of 151 submissions All important aspects of the methods of mathematical logic in computer science are addressed lambda calculus proof theory finite model theory logic programming semantics category theory and other logical systems Together these papers give a representative snapshot of the area of logical foundations of computer science **Introduction to Mathematical Logic, Fourth Edition** Elliott Mendelson,1997-06-01 The Fourth Edition of this long established text retains all the key features of the previous editions covering the basic topics of a solid first course in mathematical logic This edition includes an extensive appendix on second order logic a section on set theory with urelements and a section on the logic that results when we allow models with empty domains The text contains numerous exercises and an appendix furnishes answers to many of them Introduction to Mathematical Logic includes propositional logic first order logic first order number theory and the incompleteness and undecidability theorems of G del Rosser Church and Tarski axiomatic set theory theory of computability The study of mathematical logic axiomatic set theory and computability theory provides an understanding of the fundamental assumptions and proof techniques that form basis of mathematics Logic and computability theory have also become indispensable tools in theoretical computer science including artificial intelligence Introduction to Mathematical Logic covers these topics in a clear reader friendly style that will be

valued by anyone working in computer science as well as lecturers and researchers in mathematics philosophy and related fields

Essential Logic for Computer Science Rex Page, Ruben Gamboa, 2019-01-08 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

Handbook of Logic and Proof Techniques for Computer Science Steven G. Krantz, 2012-12-06 Logic is and should be the core subject area of modern mathematics The blueprint for twentieth century mathematical thought thanks to Hilbert and Bourbaki is the axiomatic development of the subject As a result logic plays a central conceptual role At the same time mathematical logic has grown into one of the most recondite areas of mathematics Most of modern logic is inaccessible to all but the specialist Yet there is a need for many mathematical scientists not just those engaged in mathematical research to become conversant with the key ideas of logic The Handbook of Mathematical Logic edited by Jon Barwise is in point of fact a handbook written by logicians for other mathematicians It was at the time of its writing encyclopedic authoritative and up to the moment But it was and remains a comprehensive and authoritative book for the cognoscenti The encyclopedic Handbook of Logic in Computer Science by Abramsky Gabbay and Maibaum is a wonderful resource for the professional But it is overwhelming for the casual user There is need for a book that introduces important logic terminology and concepts to the working mathematical scientist who has only a passing acquaintance with logic Thus the present work has a different target audience The intent of this handbook is to present the elements of modern logic including many current topics to the reader having only basic mathematical literacy

Logic and Computer Science Piergiorgio Odifreddi, 1990 The application of mathematical logic to computer science continues to be of major importance in the development of more advanced systems In this book a combination of survey chapters and applications work is presented

particularly concentrating on lambda calculus typed functional programming and theorem provers *Logicism Renewed* Paul C. Gilmore, 2017-03-30 Since their inception the Perspectives in Logic and Lecture Notes in Logic series have published seminal works by leading logicians Many of the original books in the series have been unavailable for years but they are now in print once again Logicism as put forward by Bertrand Russell was predicated on a belief that all of mathematics can be deduced from a very small number of fundamental logical principles In this volume the twenty third publication in the Lecture Notes in Logic series Paul C Gilmore revisits logicism in light of recent advances in mathematical logic and theoretical computer science Gilmore addresses the need for languages which can be understood by both humans and computers and using Intensional Type Theory ITT provides a unified basis for mathematics and computer science This yields much simpler foundations for recursion theory and the semantics of computer programs than those currently provided by category theory Mathematical Logic and Theoretical Computer Science Kueker, 1986-12-22 This book includes articles on denotational semantics recursion theoretic aspects of computer science model theory and algebra automata and automated reasoning stability theory topoi and mathematics and topoi and logic It is intended for mathematical logicians and computer scientists Logic for Applications Anil Nerode, Richard A. Shore, 2012-12-06 In writing this book our goal was to produce a text suitable for a first course in mathematical logic more attuned than the traditional textbooks to the recent dramatic growth in the applications of logic to computer science Thus our choice of topics has been heavily influenced by such applications Of course we cover the basic traditional topics syntax semantics soundness completeness and compactness as well as a few more advanced results such as the theorems of Skolem Lowenheim and Herbrand Much of our book however deals with other less traditional topics Resolution theorem proving plays a major role in our treatment of logic especially in its application to Logic Programming and PRO LOG We deal extensively with the mathematical foundations of all three of these subjects In addition we include two chapters on nonclassical logics modal and intuitionistic that are becoming increasingly important in computer science We develop the basic material on the syntax and semantics via Kripke frames for each of these logics In both cases our approach to formal proofs soundness and completeness uses modifications of the same tableau method introduced for classical logic We indicate how it can easily be adapted to various other special types of modal logics A number of more advanced topics including nonmonotonic logic are also briefly introduced both in the nonclassical logic chapters and in the material on Logic Programming and PROLOG **Logic for Computer Science** Steve Reeves, Michael Clarke, 1990 An understanding of logic is essential to computer science This book provides a highly accessible account of the logical basis required for reasoning about computer programs and applying logic in fields like artificial intelligence The text contains extended examples algorithms and programs written in Standard ML and Prolog No prior knowledge of either language is required The book contains a clear account of classical first order logic one of the basic tools for program verification as well as an introductory survey of modal and temporal logics and possible world semantics

An introduction to intuitionistic logic as a basis for an important style of program specification is also featured in the book

Mathematical Logic Wei Li, 2010-02-26 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 pro-schemes 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 Handbook of Logic and Proof Techniques for Computer Science Steven George Krantz, 2002

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Table of Contents Mathematical Logic For Computer Science

1. Understanding the eBook Mathematical Logic For Computer Science
 - The Rise of Digital Reading Mathematical Logic For Computer Science
 - Advantages of eBooks Over Traditional Books
2. Identifying Mathematical Logic For Computer Science
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Mathematical Logic For Computer Science
 - User-Friendly Interface
4. Exploring eBook Recommendations from Mathematical Logic For Computer Science
 - Personalized Recommendations
 - Mathematical Logic For Computer Science User Reviews and Ratings
 - Mathematical Logic For Computer Science and Bestseller Lists
5. Accessing Mathematical Logic For Computer Science Free and Paid eBooks

- Mathematical Logic For Computer Science Public Domain eBooks
 - Mathematical Logic For Computer Science eBook Subscription Services
 - Mathematical Logic For Computer Science Budget-Friendly Options
6. Navigating Mathematical Logic For Computer Science eBook Formats
 - ePub, PDF, MOBI, and More
 - Mathematical Logic For Computer Science Compatibility with Devices
 - Mathematical Logic For Computer Science Enhanced eBook Features
 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Mathematical Logic For Computer Science
 - Highlighting and Note-Taking Mathematical Logic For Computer Science
 - Interactive Elements Mathematical Logic For Computer Science
 8. Staying Engaged with Mathematical Logic For Computer Science
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Mathematical Logic For Computer Science
 9. Balancing eBooks and Physical Books Mathematical Logic For Computer Science
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Mathematical Logic For Computer Science
 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
 11. Cultivating a Reading Routine Mathematical Logic For Computer Science
 - Setting Reading Goals Mathematical Logic For Computer Science
 - Carving Out Dedicated Reading Time
 12. Sourcing Reliable Information of Mathematical Logic For Computer Science
 - Fact-Checking eBook Content of Mathematical Logic For Computer Science
 - Distinguishing Credible Sources
 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development

- Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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