

Mathematical Logic for Computer Science

Third Edition

Mordechai Ben-Ari

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Third Edition

 Springer

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Third Edition

Mathematical Logic for Computer Science is a mathematics textbook with theorems and proofs, but the science of logic is here presented by the needs of students of computer science. The method of semantic tableaux provides an elegant way to teach logic that is both theoretically sound and easy to understand. The sections on tableaux-based techniques facilitate learning advanced logical systems based on what the student has learned from elementary systems.

The logical systems presented are propositional logic, first-order logic, resolution and its applications to logic programming, Hoare logic for the verification of sequential programs, and linear temporal logic for the verification of concurrent programs.

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Mordechai Ben-Ari is with the Department of Science Teaching at the Weizmann Institute of Science. He is a Distinguished Educator of the ACM and has received the ACM/IEEE-CS Award for Outstanding Contributions to Computer Science Education. His other textbooks published by Springer are: *Logic for Software Engineers* (Second Edition) and *Principles of the Spin Model Checker*.

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Mathematical Logic For Computer Science (2nd Edition) Zhongwan Lu, 1998-08-22 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 for Computer Science Mordechai Ben-Ari, 2012-12-06 Mathematical Logic for Computer Science is a mathematics textbook with theorems and proofs but 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. To provide a balanced treatment of logic, tableaux are related to deductive proof systems. The logical systems presented are Propositional calculus including binary decision diagrams, Predicate calculus, Resolution, Hoare logic, Z Temporal logic, Answers to exercises for instructors only, as well as Prolog source code for algorithms. May be found via the Springer London web site <http://www.springer.com> 978 1 85233 319 5. Mordechai Ben Ari is an associate professor in the Department of Science Teaching of the Weizmann Institute of Science. He is the author of numerous textbooks on concurrency, programming languages and logic and has developed software tools for teaching concurrency. In 2004, Ben Ari received the ACM SIGCSE Award for Outstanding Contributions to Computer Science Education.

Logic for Computer Scientists Uwe Schöningh, 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 in logic for computer scientists.

Mathematical Logic for Computer Science Zhongwan Lu, 1998 Mathematical logic is essentially related to computer science. This book describes the aspects of mathematical logic that are

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Mathematical Logic for Computer Science M. Ben-Ari, 2003

Mathematical Logic in Computer Science B. Dömölki, Tamás Gergely, 1981

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

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

Logic for Mathematics and Computer Science Stanley Burris, 1998 This text is intended for one semester courses in Logic it can also be applied to a two semester course in either Computer Science or Mathematics Departments Unlike other texts on mathematical logic that are either too advanced too sparse in examples or exercises too traditional in coverage or too philosophical in approach this text provides an elementary hands on presentation of important mathematical logic topics new

and old that is readily accessible and relevant to all students of the mathematical sciences not just those in traditional pure mathematics

Mathematical Logic for Computer Science Zhongwan Lu, 1989 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

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 urlements 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

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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

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

Mathematical Logic and Theoretical Computer Science David Kueker, 2020-12-22 Mathematical Logic and Theoretical Computer Science covers various topics ranging from recursion theory to Zariski topoi Leading international authorities discuss selected topics in a number of areas including denotational semantics recursion theoretic aspects for

computer science model theory and algebra Automath and automated reasoning stability theory topoi and mathematics and topoi and logic The most up to date review available in its field Mathematical Logic and Theoretical Computer Science will be of interest to mathematical logicians computer scientists algebraists algebraic geometers differential geometers differential topologists and graduate students in mathematics and computer science *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 [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

[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 automath 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 Shore, 1997-01-17 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 of 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.

Logicism Renewed Paul C. Gilmore, 2005-11-18

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 *Logicism Renewed*, the author revisits this concept in light of advances in mathematical logic and the need for languages that can be understood by both humans and computers. This

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