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Language, Proof, and Logic **Proof, Logic and Formalization** *The Story of Proof* **Proof Theory and Algebra in Logic** The Structure of Proof **A Logical Introduction to Proof Handbook of Logic and Proof Techniques for Computer Science Proofs and Refutations Proof Theory of Modal Logic Hybrid Logic and its Proof-Theory** *An Introduction to Proof Theory* Proof and Falsity Proofs and Algorithms **Proof and Disproof in Formal Logic** A Logical Introduction to Proof Proofs and Computations Legal Evidence and Proof Knowledge, Proof and Dynamics *Handbook of Proof Theory* **Proof, Logic, and Conjecture Proofs from THE BOOK Logical Foundations of Proof Complexity The Semantics and Proof Theory of the Logic of Bunched Implications Galileo's Logic of Discovery and Proof** Symbolic Logic Models and Computability **Proof Theory for Fuzzy Logics Introduction to Discrete Mathematics via Logic and Proof An Introduction to Mathematical Logic and Type Theory** *Basic Proof Theory* Advances in Proof-Theoretic Semantics First Steps in Modal Logic Isabelle/HOL *A Concise Introduction to Logic* **Computational Logic and Proof Theory** Applied Proof Theory: Proof Interpretations and their Use in Mathematics Logic and Computation Reductive Logic and Proof-search *Mathematical Logic* Logical Foundations of Computer Science

Language, Proof, and Logic Nov 03 2022 Rev. ed. of: Language, proof, and logic / Jon Barwise & John Etchemendy.

Proof Theory of Modal Logic Feb 23 2022 Proof Theory of Modal Logic is devoted to a thorough study of proof systems for modal logics, that is, logics of necessity, possibility, knowledge, belief, time, computations etc. It contains many new technical results and presentations of novel proof procedures. The volume is of immense importance for the interdisciplinary fields of logic, knowledge representation, and automated deduction.

A Logical Introduction to Proof Aug 20 2021 The book is intended for students who want to learn how to prove theorems and be better prepared for the rigors required in more advance mathematics. One of the key components in this textbook is the development of a methodology to lay bare the structure underpinning the construction of a proof, much as diagramming a sentence lays bare its grammatical structure. Diagramming a proof is a way of presenting the relationships between the various parts of a proof. A proof diagram provides a tool for showing students how to write correct mathematical proofs.

Legal Evidence and Proof Jun 17 2021 As a result of recent scandals concerning evidence and proof in the administration of criminal justice - ranging from innocent people on death row in the United States to misuse of statistics leading to wrongful convictions in The Netherlands and elsewhere - inquiries into the logic of evidence and proof have taken on a new urgency both in an academic and practical sense. This study presents a broad perspective on logic by focusing on inference not just in isolation but as embedded in contexts of procedure and investigation. With special attention being paid to recent developments in Artificial Intelligence and the Law, specifically related to evidentiary reasoning, this book provides clarification of problems of logic and argumentation in relation to evidence and proof. As the vast majority of legal conflicts relate to contested facts, rather than contested law, this volume concerning facts as prime determinants of legal decisions presents an important contribution to the field for both scholars and practitioners.

Hybrid Logic and its Proof-Theory Jan 25 2022 This is the first book-length treatment of hybrid logic and its proof-theory. Hybrid logic is an extension of ordinary modal logic which allows explicit reference to individual points in a model (where the points represent times, possible worlds, states in a computer, or something else). This is useful for many applications, for example when reasoning about time one often wants to formulate a series of statements about what happens at specific times. There is little consensus about proof-theory for ordinary modal logic. Many modal-logical proof systems lack important properties and the relationships between proof systems for different modal logics are often unclear. In the present book we demonstrate that hybrid-logical proof-theory remedies these deficiencies by giving a spectrum of well-behaved proof systems (natural deduction, Gentzen, tableau, and axiom systems) for a spectrum of different hybrid logics (propositional, first-order, intensional first-order, and intuitionistic).

Proofs from THE BOOK Feb 11 2021 According to the great mathematician Paul Erdös, God maintains perfect mathematical proofs in The Book. This book presents the authors candidates for such "perfect proofs," those which contain brilliant ideas, clever connections, and wonderful observations, bringing new insight and surprising perspectives to problems from number theory, geometry, analysis, combinatorics, and graph theory. As a result, this book will be fun reading for anyone with an interest in mathematics.

Knowledge, Proof and Dynamics May 17 2021 This volume gathers selected papers presented at the Fourth Asian Workshop on Philosophical Logic, held in Beijing in October 2018. The contributions cover a wide variety of topics in modal logic (epistemic logic, temporal logic and dynamic logic), proof theory, algebraic logic, game logics, and philosophical foundations of logic. They also reflect the interdisciplinary nature of logic – a subject that has been studied in fields as diverse as philosophy, linguistics, mathematics, computer science and artificial intelligence. More specifically. The book also presents the latest developments in logic both in Asia and beyond.

Proof, Logic and Formalization Oct 02 2022 The mathematical proof is the most important form of justification in mathematics. It is not, however, the only kind of justification for mathematical propositions. The existence of other forms, some of very significant strength, places a question mark over the prominence given to proof within mathematics. This collection of essays, by leading figures working within the philosophy of mathematics, is a response to the challenge of understanding the nature and role of the proof.

Basic Proof Theory May 05 2020 This introduction to the basic ideas of structural proof theory contains a thorough discussion and comparison of various types of formalization of first-order logic. Examples are given of several areas of application, namely: the metamathematics of pure first-order logic (intuitionistic as well as classical); the theory of logic programming; category theory; modal logic; linear logic; first-order arithmetic and second-order logic. In each case the aim is to illustrate the methods in relatively simple situations and then apply them elsewhere in much more complex settings. There are numerous exercises throughout the text. In general, the only prerequisite is a standard course in first-order logic, making the book ideal for graduate students and beginning researchers in mathematical logic, theoretical computer science and artificial intelligence. For the new edition, many sections have been rewritten to improve clarity, new sections have been added on cut elimination, and solutions to selected exercises have been included.

Proof and Disproof in Formal Logic Sep 20 2021 Proof and Disproof in Formal Logic is a lively and entertaining introduction to formal logic providing an excellent insight into how a simple logic works. Formal logic allows you to check a logical claim without considering what the claim means. This highly abstracted idea is an essential and practical part of computer science. The idea of a formal system—a collection of rules and axioms which define a universe of logical proofs—is what gives us programming languages and modern-day programming. This book concentrates on using logic as a tool: making and using formal proofs and disproofs of particular logical claims. The logic it uses—natural deduction—is very small and very simple; working with it helps you see how large mathematical universes can be built on small foundations. The book is divided into four parts: · Part I "Basics" gives an introduction to formal logic with a short history of logic and explanations of some technical words. · Part II "Formal syntactic proof" show you how to do calculations in a formal system where you are guided by shapes and never need to think about meaning. Your experiments are aided by Jape, which can operate as both inquisitor and oracle. · Part III "Formal semantic disproof" shows you how to construct mathematical counterexamples to show that proof is impossible. Jape can check the counterexamples you build. · Part IV "Program specification and proof" describes how to apply your logical understanding to a real computer science problem, the accurate description and verification of programs. Jape helps, as far as arithmetic allows. Aimed at undergraduates and graduates in computer science, logic, mathematics, and philosophy, the text includes reference to and exercises based on the computer software package Jape, an interactive teaching and research tool designed and hosted by the author that is freely available on the web.

Computational Logic and Proof Theory Nov 30 2019 "The Third Kurt G

Handbook of Proof Theory Apr 15 2021 This volume contains articles covering a broad spectrum of proof theory, with an emphasis on its mathematical aspects. The articles should not only be interesting to specialists of proof theory, but should also be accessible to a diverse audience, including logicians, mathematicians, computer scientists and philosophers. Many of the central topics of proof theory have been included in a self-contained expository of articles, covered in great detail and depth. The chapters are arranged so that the two introductory articles come first; these are then followed by articles from core classical areas of proof theory; the handbook concludes with articles that deal with topics closely related to computer science.

Proofs and Computations Jul 19 2021 Driven by the question, 'What is the computational content of a (formal) proof?', this book studies fundamental interactions between proof theory and computability. It provides a unique self-contained text for advanced students and researchers in mathematical logic and computer science. Part I covers basic proof theory, computability and Gödel's theorems. Part II studies and classifies provable recursion in classical systems, from fragments of Peano arithmetic up to Π11–CA0. Ordinal analysis and the (Schwichtenberg–Wainer) subrecursive hierarchies play a central role and are used in proving the 'modified finite Ramsey' and 'extended Kruskal' independence results for PA and Π11–CA0. Part III develops the theoretical underpinnings of the first author's proof assistant MINLOG. Three chapters cover higher-type computability via information systems, a constructive theory TCF of computable functionals, realizability, Dialectica interpretation, computationally significant quantifiers and connectives and polytime complexity in a two-sorted, higher-type arithmetic with linear logic.

Introduction to Discrete Mathematics via Logic and Proof Jul 07 2020 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.

The Semantics and Proof Theory of the Logic of Bunched Implications Dec 12 2020 This is a monograph about logic. Specifically, it presents the mathe matical theory of the logic of bunched implications, BI: I consider Bl's proof theory, model theory and computation theory. However, the mono graph is also about informatics in a sense which I explain. Specifically, it is about mathematical models of resources and logics for reasoning about resources. I begin with an introduction which presents my (background) view of logic from the point of view of informatics, paying particular attention to three logical topics which have arisen from the development of logic within informatics: • Resources as a basis for semantics; • Proof-search as a basis for reasoning; and • The theory of representation of object-logics in a meta-logic. The ensuing development represents a logical theory which draws upon the mathematical, philosophical and computational aspects of logic. Part I presents the logical theory of propositional BI, together with a computational interpretation. Part II presents a corresponding devel opment for predicate BI. In both parts, I develop proof-, model- and type-theoretic analyses. I also provide semantically-motivated compu tational perspectives, so beginning a mathematical theory of resources. I have not included any analysis, beyond conjecture, of properties such as decidability, finite models, games or complexity. I prefer to leave these matters to other occasions, perhaps in broader contexts.

Logic and Computation Sep 28 2019 This book is concerned with techniques for formal theorem-proving, with particular reference to Cambridge LCF (Logic for Computable Functions). Cambridge LCF is a computer program for reasoning about computation. It combines the methods of mathematical logic with domain theory, the basis of the denotational approach to specifying the meaning of program statements. Cambridge LCF is based on an earlier theorem-proving system, Edinburgh LCF, which introduced a design that gives the user flexibility to use and extend the system. A goal of this book is to explain the design, which has been adopted in several other systems. The book consists of two parts. Part I outlines the mathematical preliminaries, elementary logic and domain theory, and explains them at an intuitive level, giving reference to more advanced reading; Part II provides sufficient detail to serve as a reference manual for Cambridge LCF. It will also be a useful guide for implementors of other programs based on the LCF approach.

Galileo’s Logic of Discovery and Proof Nov 10 2020 This volume is presented as a companion study to my translation of Galileo's MS 27, Galileo's Logical Treatises, which contains Galileo's appropriated questions on Aristotle's Posterior Analytics - a work only recently transcribed from the Latin autograph. Its purpose is to acquaint an English-reading audience with the teaching in those treatises. This is basically a sixteenth-century logic of discovery and of proof about which little is known in the present day, yet one that arguably guided the most significant research program of the seventeenth century. Despite its historical and systematic importance, the teaching is difficult to explain to the modern reader. Part of the problem stems from the fragmentary nature of the manuscript in which it is preserved, part from the contents of the teaching itself, which requires a considerable propadeutic for its comprehension. A word of explanation is thus required to set out the structure of the volume and to detail the editorial decisions that underlie its organization. Two major manuscript studies have advanced the cause of scholarship on Galileo within the past two decades. The first relates to Galileo's experimental activity at Padua prior to his discoveries with the telescope that led to the publication of his Sidereus nuncius in 1610. Much of this activity has been uncovered by Stillman Drake in analyses of manuscript fragments associated with the composition of Galileo's Two New Sciences, fragments now bound in a codex identified as MS 72 in the collection of Galileiana at the Biblioteca Nazionale Centrale in Florence.

Applied Proof Theory: Proof Interpretations and their Use in Mathematics Oct 29 2019 This is the first treatment in book format of proof-theoretic transformations - known as proof interpretations - that focuses on applications to ordinary mathematics. It covers both the necessary logical machinery behind the proof interpretations that are used in recent applications as well as – via extended case studies – carrying out some of these applications in full detail. This subject has historical roots in the 1950s. This book for the first time tells the whole story.

Proof Theory for Fuzzy Logics Aug 08 2020 Fuzzy logics are many-valued logics that are well suited to reasoning in the context of vagueness. They provide the basis for the wider field of Fuzzy Logic, encompassing diverse areas such as fuzzy control, fuzzy databases, and fuzzy mathematics. This book provides an accessible and up-to-date introduction to this fast-growing and increasingly popular area. It focuses in particular on the development and applications of "proof-theoretic" presentations of fuzzy logics; the result of more than ten years of intensive work by researchers in the area, including the authors. In addition to providing alternative elegant presentations of fuzzy logics, proof-theoretic methods are useful for addressing theoretical problems (including key standard completeness results) and developing efficient deduction and decision algorithms. Proof-theoretic presentations also place fuzzy logics in the broader landscape of non-classical logics, revealing deep relations with other logics studied in Computer Science, Mathematics, and Philosophy. The book builds methodically from the semantic origins of fuzzy logics to proof-theoretic presentations such as Hilbert and Gentzen systems, introducing both theoretical and practical applications of these presentations.

A Logical Introduction to Proof May 29 2022 The book is intended for students who want to learn how to prove theorems and be better prepared for the rigors required in more advance mathematics. One of the key components in this textbook is the development of a methodology to lay bare the structure underpinning the construction of a proof, much as diagramming a sentence lays bare its grammatical structure. Diagramming a proof is a way of presenting the relationships between the various parts of a proof. A proof diagram provides a tool for showing students how to write correct mathematical proofs.

An Introduction to Proof Theory Dec 24 2021 An Introduction to Proof Theory provides an accessible introduction to the theory of proofs, with details of proofs worked out and examples and exercises to aid the reader's understanding. It also serves as a companion to reading the original pathbreaking articles by Gerhard Gentzen. The first half covers topics in structural proof theory, including the Gödel-Gentzen translation of classical into intuitionistic logic (and arithmetic), natural deduction and the normalization theorems (for both NJ and NK), the sequent calculus, including cut-elimination and mid-sequent theorems, and various applications of these results. The second half examines ordinal proof theory, specifically Gentzen's consistency proof for first-order Peano Arithmetic. The theory of ordinal notations and other elements of ordinal theory are developed from scratch, and no knowledge of set theory is presumed. The proof methods needed to establish proof-theoretic results, especially proof by induction, are introduced in stages throughout the text. Mancosu, Galvan, and Zach's introduction will provide a solid foundation for those looking to understand this central area of mathematical logic and the philosophy of mathematics.

Proofs and Refutations Mar 27 2022 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.

Proof and Falsity Nov 22 2021 Provides an original analysis of negation - a central concept of logic - and how to define its meaning in proof-theoretic semantics.

Proof, Logic, and Conjecture Mar 15 2021 This text is designed to teach students how to read and write proofs in mathematics and to acquaint them with how mathematicians investigate problems and formulate conjecture.

A Concise Introduction to Logic Jan 01 2020

An Introduction to Mathematical Logic and Type Theory Jun 05 2020 In case you are considering to adopt this book for courses with over 50 students, please contact ties.nijssen@springer.com for more information. This introduction to mathematical logic starts with propositional calculus and first-order logic. Topics covered include syntax, semantics, soundness, completeness, independence, normal forms, vertical paths through negation normal formulas, compactness, Smullyan's Unifying Principle, natural deduction, cut-elimination, semantic tableaux, Skolemization, Herbrand's Theorem, unification, duality, interpolation, and definability. The last three chapters of the book provide an introduction to type theory (higher-order logic). It is shown how various mathematical concepts can be formalized in this very expressive formal language. This expressive notation facilitates proofs of the classical incompleteness and undecidability theorems which are very elegant and easy to understand. The discussion of semantics makes clear the important distinction between standard and nonstandard models which is so important in understanding puzzling phenomena such as the incompleteness theorems and Skolem's Paradox about countable models of set theory. Some of the numerous exercises require giving formal proofs. A computer program called ETPS which is available from the web facilitates doing and checking such exercises. Audience: This volume will be of interest to mathematicians, computer scientists, and philosophers in universities, as well as to computer scientists in industry who wish to use higher-order logic for hardware and software specification and verification.

Logical Foundations of Computer Science Jun 25 2019 A Sobolev gradient of a real-valued functional is a gradient of that functional taken relative to the underlying Sobolev norm. This book shows how descent methods using such gradients allow a unified treatment of a wide variety of problems in differential equations. Equal emphasis is placed on numerical and theoretical matters. Several concrete applications are made to illustrate the method. These applications include (1) Ginzburg-Landau functionals of superconductivity, (2) problems of transonic flow in which type depends locally on nonlinearities, and (3) minimal surface problems. Sobolev gradient constructions rely on a study of orthogonal projections onto graphs of closed densely defined linear transformations from one Hilbert space to another. These developments use work of Weyl, von Neumann and Beurling.

Handbook of Logic and Proof Techniques for Computer Science Apr 27 2022 Logic is, and should be, the core subject area of modern mathemat ics. 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 special ist. 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 Bar wise, is in point of fact a handbook written by logicians for other mathe maticians. 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 mathe matical literacy.

Proofs and Algorithms Oct 22 2021 Logic is a branch of philosophy, mathematics and computer science. It studies the required methods to determine whether a statement is true, such as reasoning and computation. Proofs and Algorithms: Introduction to Logic and Computability is an introduction to the fundamental concepts of contemporary logic - those of a proof, a computable function, a model and a set. It presents a series of results, both positive and negative, - Church's undecidability theorem, Gödel’s incompleteness theorem, the theorem asserting the semi-decidability of provability - that have profoundly changed our vision of reasoning, computation, and finally truth itself. Designed for undergraduate students, this book presents all that philosophers, mathematicians and computer scientists should know about logic.

Mathematical Logic Jul 27 2019 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.

Logical Foundations of Proof Complexity Jan 13 2021 This book treats bounded arithmetic and propositional proof complexity from the point of view of computational complexity. The first seven chapters include the necessary logical background for the material and are suitable for a graduate course. Associated with each of many complexity classes are both a two-sorted predicate calculus theory, with induction restricted to concepts in the class, and a propositional proof system. The complexity classes range from AC0 for the weakest theory up to the polynomial hierarchy. Each bounded theorem in a theory translates into a family of (quantified) propositional tautologies with polynomial size proofs in the corresponding proof system. The theory proves the soundness of the associated proof system. The result is a uniform treatment of many systems in the literature, including Buss's theories for the polynomial hierarchy and many disparate systems for complexity classes such as AC0, AC0(m), TC0, NC1, L, NL, NC, and P.

The Structure of Proof Jun 29 2022 For a one-semester freshman or sophomore level course on the fundamentals of proof writing or transition to advanced mathematics course. Rather than teach mathematics and the structure of proofs simultaneously, this text first introduces logic as the foundation of proofs and then demonstrates how logic applies to mathematical topics. This method ensures that the students gain a firm understanding of how logic interacts with mathematics and empowers them to solve more complex problems in future math courses.

The Story of Proof Sep 01 2022 How the concept of proof has enabled the creation of mathematical knowledge The Story of Proof investigates the evolution of the concept of proof—one of the most significant and defining features of mathematical thought—through critical episodes in its history. From the Pythagorean theorem to modern times, and across all major mathematical disciplines, John Stillwell demonstrates that proof is a mathematically vital concept, inspiring innovation and playing a critical role in generating knowledge. Stillwell begins with Euclid and his influence on the development of geometry and its methods of proof, followed by algebra, which began as a self-contained discipline but later came to rival geometry in its mathematical impact. In particular, the infinite processes of calculus were at first viewed as “infinitesimal algebra,” and calculus became an arena for algebraic, computational proofs rather than axiomatic proofs in the style of Euclid. Stillwell proceeds to the areas of number theory, non-Euclidean geometry, topology, and logic, and peers into the deep chasm between natural number arithmetic and the real numbers. In its depths, Cantor, Gödel, Turing, and others found that the concept of proof is ultimately part of arithmetic. This startling fact imposes fundamental limits on what theorems can be proved and what problems can be solved. Shedding light on the workings of mathematics at its most fundamental levels, The Story of Proof offers a compelling new perspective on the field’s power and progress.

Advances in Proof-Theoretic Semantics Apr 03 2020 This volume is the first ever collection devoted to the field of proof-theoretic semantics. Contributions address topics including the systematics of introduction and elimination rules and proofs of normalization, the categorial characterization of deductions, the relation between Heyting's and Gentzen's approaches to meaning, knowability paradoxes, proof-theoretic foundations of set theory, Dummett's justification of logical laws, Kreisel's theory of constructions, paradoxical reasoning, and the defence of model theory. The field of proof-theoretic semantics has existed for almost 50 years, but the term itself was proposed by Schroeder-Heister in the 1980s. Proof-theoretic semantics explains the meaning of linguistic expressions in general and of logical constants in particular in terms of the notion of proof. This volume emerges from presentations at the Second International Conference on Proof-Theoretic Semantics in Tübingen in 2013, where contributing authors were asked to provide a self-contained description and analysis of a significant research question in this area. The contributions are representative of the field and should be of interest to logicians, philosophers, and mathematicians alike.

Reductive Logic and Proof-search Aug 27 2019 This book is a specialized monograph on the development of the mathematical and computational metatheory of reductive logic and proof-search, areas of logic that are becoming important in computer science. A systematic foundational text on these emerging topics, it includes proof-theoretic, semantic/model-theoretic and algorithmic aspects. The scope ranges from the conceptual background to reductive logic, through its mathematical metatheory, to its modern applications in the computational sciences. Suitable for researchers and graduate students in mathematical, computational and philosophical logic, and in theoretical computer science and artificial intelligence, this is the latest in the prestigous world-renowned Oxford Logic Guides, which contains Michael Dummet's Elements of intuitionism (2nd Edition), Dov M. Gabbay, Mark A. Reynolds, and Marcelo Finger's Temporal Logic Mathematical Foundations and Computational Aspects , J. M. Dunn and G. Hardegree's Algebraic Methods in Philosophical Logic, H. Rott's Change, Choice and Inference: A Study of Belief Revision and Nonmonotonic Reasoning , and P. T. Johnstone's Sketches of an Elephant: A Topos Theory Compendium: Volumes 1 and 2 .

Symbolic Logic Oct 10 2020 Brimming with visual examples of concepts, derivation rules, and proof strategies, this introductory text is ideal for students with no previous experience in logic. Students will learn translation both from formal language into English and from English into formal language; how to use truth trees and truth tables to test propositions for logical properties; and how to construct and strategically use derivation rules in proofs.

Proof Theory and Algebra in Logic Jul 31 2022 This book offers a concise introduction to both proof-theory and algebraic methods, the core of the syntactic and semantic study of logic respectively. The importance of combining these two has been increasingly recognized in recent years. It highlights the contrasts between the deep, concrete results using the former and the general, abstract ones using the latter. Covering modal logics, many-valued logics, superintuitionistic and substructural logics, together with their algebraic semantics, the book also provides an introduction to nonclassical logic for undergraduate or graduate level courses.The book is divided into two parts: Proof Theory in Part I and Algebra in Logic in Part II. Part I presents sequent systems and discusses cut elimination and its applications in detail. It also provides simplified proof of cut elimination, making the topic more accessible. The last chapter of Part I is devoted to clarification of the classes of logics that are discussed in the second part. Part II focuses on algebraic semantics for these logics. At the same time, it is a gentle introduction to the basics of algebraic logic and universal algebra with many examples of their applications in logic. Part II can be read independently of Part I, with only minimum knowledge required, and as such is suitable as a textbook for short introductory courses on algebra in logic.

First Steps in Modal Logic Mar 03 2020 This is a first course in propositional modal logic, suitable for mathematicians, computer scientists and philosophers. Emphasis is placed on semantic aspects, in the form of labelled transition structures, rather than on proof theory.

Isabelle/HOL Jan 31 2020 This volume is a self-contained introduction to interactive proof in high- order logic (HOL), using the proof assistant Isabelle 2002. Compared with existing Isabelle documentation, it provides a direct route into higher-order logic, which most people prefer these days. It bypasses ?rst-order logic and minimizes discussion of meta-theory. It is written for potential users rather than for our colleagues in the research world. Another departure from previous documentation is that we describe Markus Wenzel’s proof script notation instead of ML tactic scripts. The l- ter make it easier to introduce new tactics on the ?y, but hardly anybody does that. Wenzel’s dedicated syntax is elegant, replacing for example eight simpli?cation tactics with a single method, namely simp, with associated - tions. The book has three parts. – The ?rst part, Elementary Techniques, shows how to model functional programs in higher-order logic. Early examples involve lists and the natural numbers. Most proofs are two steps long, consisting of induction on a chosen variable followed by the auto tactic. But even this elementary part covers such advanced topics as nested and mutual recursion. – The second part, Logic and Sets, presents a collection of lower-level tactics that you can use to apply rules selectively. It also describes I- belle/HOL’s treatment of sets, functions, and relations and explains how to de?ne sets inductively. One of the examples concerns the theory of model checking, and another is drawn from a classic textbook on formal languages.

Models and Computability Sep 08 2020 Second of two volumes providing a comprehensive guide to the current state of mathematical logic.