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First-Order Logic First-order Logic Metalogic First-Order Logic and Automated Theorem Proving First Order Logic Extensions of First-Order Logic First Order Mathematical Logic Fragments of First-Order Logic A Philosophical Companion to First-order Logic Duality and Definability in First Order Logic First-Order Logic First-Order Logic Classical First-Order Logic First-Order Logic and Automated Theorem Proving First-Order Modal Logic Propositional and Predicate Calculus: A Model of Argument First-order Logic Revisited Foundations without Foundationalism Tableau Systems for First Order Number Theory and Certain Higher Order Theories Relative Complexities of First Order Calculi Mathematical Logic Logic and Complexity Tableau Systems for First Order Number Theory and Certain Higher Order Theories Higher-Order Logic and Type Theory Semigroups Underlying First-Order Logic Decidability of Logical Theories and Their Combination A First Course in Logic Formal Logic Handbook of Philosophical Logic Beyond First Order Model Theory, Volume II First-Order Dynamic Logic First-Order Programming Theories Duality and Definability in First Order Logic Dependence Logic Intensional First-Order Logic Introduction To The Theory Of Logic Logic with Trees Proof in Alonzo Church's and Alan Turing's Mathematical Logic: Undecidability of First Order Logic The Principles of Mathematics Revisited Programming with Higher-Order Logic

First-Order Logic *2012-12-06*

except for this preface this study is completely self contained it is intended to serve both as an introduction to quantification theory and as an exposition of new results and techniques in analytic or cut free methods we use the term analytic to apply to any proof procedure which obeys the subformula principle we think of such a procedure as analysing the formula into its successive components gentzen cut free systems are perhaps the best known example of ana lytic proof procedures natural deduction systems though not usually analytic can be made so as we demonstrated in 3 in this study we emphasize the tableau point of view since we are struck by its simplicity and mathematical elegance chapter i is completely introductory we begin with preliminary material on trees necessary for the tableau method and then treat the basic syntactic and semantic fundamentals of propositional logic we use the term boolean valuation to mean any assignment of truth values to all formulas which satisfies the usual truth table conditions for the logical connectives given an assignment of truth values to all propositional variables the truth values of all other formulas under this assignment is usually defined by an inductive procedure we indicate in chapter i how this inductive definition can be made explicit to this end we find useful the notion of a formation tree which we discuss earlier

First-order Logic *1998*

an introduction to principles and notation of modern symbolic logic for those with no prior courses the structure of material follows that of quine s methods of logic and may be used as an introduction to that work with sections on truth functional logic predicate logic relational logic and identity and description exercises are based on problems designed by authors including quine john cooley richard jeffrey and lewis carroll annotation copyrighted by book news inc portland or

Metalogic *1973-06-26*

this work makes available to readers without specialized training in mathematics complete proofs of the fundamental metatheorems of standard i e basically truth functional first order logic included is a complete proof accessible to non mathematicians of the undecidability of first order logic the most important fact about logic to emerge from the work of the last half century hunter explains concepts of mathematics and set theory along the way for the benefit of non mathematicians he also provides ample exercises with comprehensive answers

First-Order Logic and Automated Theorem Proving 2012-12-06

there are many kinds of books on formal logic some have philosophers as their intended audience some mathematicians some computer scientists although there is a common core to all such books they will be very dif ferent in emphasis methods and even appearance this book is intended for computer scientists but even this is not precise within computer sci ence formal logic turns up in a number of areas from program verification to logic programming to artificial intelligence this book is intended for computer scientists interested in automated theorem proving in classical logic to be more precise yet it is essentially a theoretical treatment not a how to book although how to issues are not neglected this does not mean of course that the book will be of no interest to philosophers or mathematicians it does contain a thorough presentation of formal logic and many proof techniques and as such it contains all the material one would expect to find in a course in formal logic covering completeness but not incompleteness issues the first item to be addressed is what are we talking about and why are we interested in it we are primarily talking about truth as used in mathematical discourse and our interest in it is or should be self evident truth is a semantic concept so we begin with models and their properties these are used to define our subject

First Order Logic 2023-06-25

what is first order logic first order logic is a collection of formal systems that are utilized in the fields of mathematics philosophy linguistics and computer science other names for first order logic include predicate logic quantificational logic and first order predicate calculus in first order logic quantified variables take precedence over non logical objects and the use of sentences that contain variables is permitted as a result rather than making assertions like socrates is a man one can

make statements of the form there exists x such that x is socrates and x is a man where there exists is a quantifier and x is a variable this is in contrast to propositional logic which does not make use of quantifiers or relations propositional logic serves as the basis for first order logic in this sense how you will benefit i insights and validations about the following topics chapter 1 first order logic chapter 2 axiom chapter 3 propositional calculus chapter 4 peano axioms chapter 5 universal quantification chapter 6 conjunctive normal form chapter 7 consistency chapter 8 zermelo fraenkel set theory chapter 9 interpretation logic chapter 10 quantifier rank ii answering the public top questions about first order logic iii real world examples for the usage of first order logic in many fields who this book is for professionals undergraduate and graduate students enthusiasts hobbyists and those who want to go beyond basic knowledge or information for any kind of first order logic

Extensions of First-Order Logic *1996-03-29*

an introduction to many sorted logic as an extension of first order logic

First Order Mathematical Logic *1990-01-01*

attractive and well written introduction journal of symbolic logic the logic that mathematicians use to prove their theorems is itself a part of mathematics in the same way that algebra analysis and geometry are parts of mathematics this attractive and well written introduction to mathematical logic is aimed primarily at undergraduates with some background in college level mathematics however little or no acquaintance with abstract mathematics is needed divided into three chapters the book begins with a brief encounter of naïve set theory and logic for the beginner and proceeds to set forth in elementary and intuitive form the themes developed formally and in detail later in chapter two the predicate calculus is developed as a formal axiomatic theory the statement calculus presented as a part of the predicate calculus is treated in detail from the axiom schemes through the deduction theorem to the completeness theorem then the full predicate calculus is taken up again and a smooth running technique for proving theorem schemes is developed and exploited chapter three is devoted to first order theories i e mathematical theories for which the predicate calculus serves as a base axioms and short developments are given for number theory and a few algebraic theories then the metamathematical notions of consistency completeness independence categoricity and decidability are discussed the predicate calculus is proved to be complete the book concludes with an outline of godel s incompleteness theorem ideal for a one semester course this concise text offers more detail and mathematically relevant examples than those available in elementary books on logic carefully chosen exercises with selected answers help students test their grasp of the material for any student of mathematics logic or the interrelationship of the two this book represents a thought provoking introduction to the logical underpinnings of mathematical theory an excellent text mathematical reviews

Fragments of First-Order Logic *2023-03-30*

a sentence of first order logic is satisfiable if it is true in some structure and finitely satisfiable if it is true in some finite structure the question arises as to whether there exists an algorithm for determining whether a given formula of first order logic is satisfiable or indeed finitely satisfiable this question was answered negatively in 1936 by church and turing for satisfiability and in 1950 by trakhtenbrot for finite satisfiability in contrast the satisfiability and finite satisfiability problems are algorithmically solvable for restricted subsets or as we say fragments of first order logic a fact which is today of considerable interest in computer science this book provides an up to date survey of the principal axes of research charting the limits of decision in first order logic and exploring the trade off between expressive power and complexity of reasoning divided into three parts the book considers for which fragments of first order logic there is an effective method for determining satisfiability or finite satisfiability furthermore if these problems are decidable for some fragment what is their computational complexity part i focusses on fragments defined by restricting the set of available formulas topics covered include the aristotelian syllogistic and its relatives the two variable fragment the guarded fragment the quantifier prefix fragments and the fluted fragment part ii investigates logics with counting quantifiers starting with de morgan s numerical generalization of the aristotelian syllogistic we proceed to the two variable fragment with counting quantifiers and its guarded subfragment explaining the applications of the latter to the problem of query answering in structured data part iii concerns logics characterized by semantic constraints limiting the available interpretations of certain predicates taking propositional modal logic and graded modal logic as our cue we return to the satisfiability problem for two variable first order logic and its relatives but this time with certain distinguished binary predicates constrained to be interpreted as equivalence relations or transitive relations the work finishes slightly breaching the bounds of first order logic proper with a chapter on logics interpreted over trees

A Philosophical Companion to First-order Logic *1993*

using the theory of categories as a framework this book develops a duality theory for theories in first order logic in which the dual of a theory is the category of its models with suitable additional structure this duality theory resembles and generalizes m h stone s famous duality theory for boolean algebras as an application the author derives a result akin to the well known definability theorem of e w beth this new definability theorem is related to theorems of descent in category theory and algebra and can also be stated as a result in pure logic without reference to category theory containing novel techniques as well as applications of classical methods this carefuly written book shows an attention to both organization and detail and will appeal to mathematicians and philosophers interested in category theory

Duality and Definability in First Order Logic *1993*

in his introduction to this most welcome republication and second edition of his logic text heil clarifies his aim in writing and revising this book i believe that anyone unfamiliar with the subject who set out to learn formal logic could do so relying solely on this book that in any case is what i set out to create in writing an introduction to first order logic heil has certainly accomplished this with perhaps the most explanatorily thorough and pedagogically rich text i ve personally come across heil s text stands out as being remarkably careful in its presentation and illuminating in its explanations especially given its relatively short length when compared to the average logic textbook it hits all of the necessary material that must be covered in an introductory deductive logic course and then some it also takes occasional excursions into side topics successfully whetting the reader s appetite for more advanced studies in logic the book is clearly written by an expert who has put in the effort for his readers bothering at every step to see the point and then explain it clearly to his readers heil has found some very clever original ways to introduce motivate and otherwise teach this material the author s own special expertise and perspective especially when it comes to tying philosophy of mind linguistics and philosophy of language into the lessons of logic make for a creative and fresh take on basic logic with its unique presentation and illuminating explanations this book comes about as close as a text can come to imitating the learning environment of an actual classroom indeed working through its presentations carefully the reader feels as though he or she has just attended an illuminating lecture on the relevant topics jonah schupbach university of utah

First-Order Logic *2021-10-06*

except for this preface this study is completely self contained it is intended to serve both as an introduction to quantification theory and as an exposition of new results and techniques in analytic or cut free methods we use the term analytic to apply to any proof procedure which obeys the subformula principle we think of such a procedure as analysing the formula into its successive components gentzen cut free systems are perhaps the best known example of ana lytic proof procedures natural deduction systems though not usually analytic can be made so as we demonstrated in 3 in this study we emphasize the tableau point of view since we are struck by its simplicity and mathematical elegance chapter i is completely introductory we begin with preliminary material on trees necessary for the tableau method and then treat the basic syntactic and semantic fundamentals of propositional logic we use the term boolean valuation to mean any assignment of truth values to all formulas which satisfies the usual truth table conditions for the logical connectives given an assignment of truth values to all propositional variables the truth values of all other formulas under this assignment is usually defined by an inductive procedure we indicate in chapter i how this inductive definition can be made explicit to this end we find useful the notion of a formation tree which we discuss earlier

First-Order Logic *2012-04-14*

one is often said to be reasoning well when they are reasoning logically many attempts to say what logical reasoning is have been proposed but one commonly proposed system is first order classical logic this element will examine the basics of first order classical logic and discuss some surrounding philosophical issues the first half of the element develops a language for the system as well as a proof theory and model theory the authors provide theorems about the system they developed such as unique readability and the lindenbaum lemma they also discuss the meta theory for the system and provide several results there including proving soundness and completeness theorems the second half of the element compares first order classical logic to other systems classical higher order logic intuitionistic logic and several paraconsistent logics which reject the law of ex falso quodlibet

Classical First-Order Logic 2022-05-19

this monograph on classical logic presents fundamental concepts and results in a rigorous mathematical style applications to automated theorem proving are considered and usable programs in prolog are provided this material can be used both as a first text in formal logic and as an introduction to automation issues and is intended for those interested in computer science and mathematics at the beginning graduate level the book begins with propositional logic then treats first order logic and finally first order logic with equality in each case the initial presentation is semantic boolean valuations for propositional logic models for first order logic and normal models when equality is added this defines the intended subjects independently of a particular choice of proof mechanism then many kinds of proof procedures are introduced tableau resolution natural deduction gentzen sequent and axiom systems completeness issues are centered in a model existence theorem which permits the coverage of a variety of proof procedures without repetition of detail in addition results such as compactness interpolation and the beth definability theorem are easily established implementations of tableau theorem provers are given in prolog and resolution is left as a project for the student

First-Order Logic and Automated Theorem Proving 2012

this is a thorough treatment of first order modal logic the book covers such issues as quantification equality including a treatment of frege s morning star evening star puzzle the notion of existence non rigid constants and function symbols predicate abstraction the distinction between nonexistence and nondesignation and definite descriptions borrowing from both fregean and russellian paradigms

First-Order Modal Logic *2023-11-22*

designed specifically for guided independent study features a wealth of worked examples and exercises many with full teaching solutions that encourage active participation in the development of the material it focuses on core material and provides a solid foundation for further study

Propositional and Predicate Calculus: A Model of Argument *2005-09-08*

proceedings from the conference fol75 75 years of first order logic held at humboldt university berlin germany september 18 21 2003 pref

First-order Logic Revisited *2004*

the central contention of this book is that second order logic has a central role to play in laying the foundations of mathematics in order to develop the argument fully the author presents a detailed development of higher order logic including a comprehensive discussion of its semantics professor shapiro demonstrates the prevalence of second order notions in mathematics is practised and also the extent to which mathematical concepts can be formulated in second order languages he shows how first order languages are insufficient to codify many concepts in contemporary mathematics and thus that higher order logic is needed to fully reflect current mathematics throughout the emphasis is on discussing the philosophical and historical issues associated with this subject and the implications that they have for foundational studies for the most part the author assumes little more than a familiarity with logic as might be gained from a beginning graduate course which includes the incompleteness of arithmetic and the lowenheim skolem theorems all those concerned with the foundations of mathematics will find this a thought provoking discussion of some of the central issues in this subject

Foundations without Foundationalism *1991-09-19*

in this paper a comparison is made of several proof calculi in terms of the lengths of shortest proofs for some given formula of first order predicate logic with function symbols in particular we address the question whether given two calculi any derivation in one of them can be simulated in the other in polynomial time the analogous question for propositional logic has been intensively studied by various authors because of its implications for complexity theory and it seems there has not been as much

endeavour in this field in first order logic as there has been in propositional logic on the other hand for most of the practical applications of logic a powerful tool such as the language of first order logic is needed the main interest of this investigation lies in the calculi most frequently used in automated theorem proving the resolution calculus and analytic calculi such as the tableau calculus and the connection method in automated theorem proving there are two important aspects of complexity in order to have a good theorem proving system we must first have some calculus in which we can express our derivations in concise form and second there must be an efficient search strategy this book deals mainly with the first aspect which is a necessary condition for the second since the length of a shortest proof always also gives a lower bound to the complexity of any strategy

Tableau Systems for First Order Number Theory and Certain Higher Order Theories *2006-11-15*

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

Relative Complexities of First Order Calculi 1992-01-01

logic and complexity looks at basic logic as it is used in computer science and provides students with a logical approach to complexity theory with plenty of exercises this book presents classical notions of mathematical logic such as decidability completeness and incompleteness as well as new ideas brought by complexity theory such as np completeness randomness and approximations providing a better understanding for efficient algorithmic solutions to problems divided into three parts it covers model theory and recursive functions introducing the basic model theory of propositional 1st order inductive definitions and 2nd order logic recursive functions turing computability and decidability are also examined descriptive complexity looking at the relationship between definitions of problems queries properties of programs and their computational complexity approximation explaining how some optimization problems and counting problems can be approximated according to their logical form logic is important in computer science particularly for verification problems and database query languages such as sql students and researchers in this field will find this book of great interest

Mathematical Logic *2021-05-28*

this element is an exposition of second and higher order logic and type theory it begins with a presentation of the syntax and semantics of classical second order logic pointing up the contrasts with first order logic this leads to a discussion of higher order logic based on the concept of a type the second section contains an account of the origins and nature of type theory and its relationship to set theory section 3 introduces local set theory also known as higher order intuitionistic logic an important form of type theory based on intuitionistic logic in section 4 number of contemporary forms of type theory are described all of which are based on the so called doctrine of propositions as types we conclude with an appendix in which the semantics for local set theory based on category theory is outlined

Logic and Complexity 2012-12-06

boolean relation induced and other operations for dealing with first order definability uniform relations between sequences diagonal relations uniform diagonal relations and some kinds of bisections or bisectable relations presentation of $\mathbf{s}$ q $\mathbf{s}$ p and related structures presentation of $\mathbf{s}$ pq $\mathbf{s}$ pe and related structures appendix presentation of $\mathbf{s}$ pqe and related structures bibliography index of symbols index of phrases and subjects list of relations involved in presentations synopsis of presentations

<u>Tableau Systems for First Order Number Theory and Certain Higher Order Theories</u> *1975*

this textbook provides a self contained introduction to decidability of first order theories and their combination the technical material is presented in a systematic and

universal way and illustrated with plenty of examples and a range of proposed exercises after an overview of basic first order logic concepts the authors discuss some model theoretic notions like embeddings diagrams and elementary substructures the text then goes on to explore an applicable way to deduce logical consequences from a given theory and presents sufficient conditions for a theory to be decidable the chapters that follow focus on quantifier elimination decidability of the combination of first order theories and the basics of computability theory the inclusion of a chapter on gentzen calculus cut elimination and craig interpolation as well as a chapter on combination of theories and preservation of decidability help to set this volume apart from similar books in the field decidability of logical theories and their combination is ideal for graduate students of mathematics and is equally suitable for computer science philosophy and physics students who are interested in gaining a deeper understanding of the subject the book is also directed to researchers that intend to get acquainted with first order theories and their combination

Higher-Order Logic and Type Theory 2022-03-31

the ability to reason and think in a logical manner forms the basis of learning for most mathematics computer science philosophy and logic students based on the author s teaching notes at the university of maryland and aimed at a broad audience this text covers the fundamental topics in classical logic in an extremely clear thorough and accurate style that is accessible to all the above covering propositional logic first order logic and second order logic as well as proof theory computability theory and model theory the text also contains numerous carefully graded exercises and is ideal for a first or refresher course

Semigroups Underlying First-Order Logic 2006

the first beginning logic text to employ the tree method a complete formal system of first order logic that is remarkably easy to understand and use this text allows students to take control of the nuts and bolts of formal logic quickly and to move on to more complex and abstract problems the tree method is elaborated in manageable steps over five chapters in each of which its adequacy is reviewed soundness and completeness proofs are extended at each step and the decidability proof is extended at the step from truth functions to the logic of nonoverlapping quantifiers with a single variable after which undecidability is demonstrated by example the first three chapters are bilingual with arguments presented twice in logical notation and in english the last three chapters consider the discoveries defining the scope and limits of formal methods that marked logic s coming of age in the 20th century godel s completeness and incompleteness theorems for first and second order logic and the church turing theorem on the undecidability of first order logic this new edition provides additional problems solutions to selected problems and two new supplements truth functional equivalence reinstates material on that topic from the second edition that was omitted in the third and variant methods in which john burgess provides a proof regarding the possibility of modifying the tree method so that it will always find a finite model when there is one and another which shows that a different modification once contemplated by jeffrey can result in a dramatic speed up of certain proofs

Decidability of Logical Theories and Their Combination *2020-10-20*

the aim of the first volume of the present handbook of philosophical logic is essentially two fold first of all the chapters in this volume should provide a concise overview of the main parts of classical logic second these chapters are intended to present all the relevant background material necessary for the understanding of the contributions which are to follow in the next three volumes we have thought it to be of importance that the connections between classical logic and its extensions covered in volume 11 as well as its most important alternatives covered in volume ill be brought out clearly from the start the first chapter presents a clear and detailed picture of the range of what is generally taken to be the standard logical framework namely predicate or first order quantificational logic on the one hand this chapter surveys both propositionai logic and first order predicate logic and on the other hand presents the main metalogical results obtained for them chapter 1 1 also contains a discussion of the limits of first order logic i e it presents an answer to the question why has predicate logic played such a formidable role in the formalization of mathematics and in the many areas of philo sophical and linguistic applications chapter 1 1 is prerequisite for just about all the other chapters in the entire handbook while the other chapters in volume i provide more detailed discussions of material developed or hinted at in the first chapter

A First Course in Logic 2004-07-08

model theory is the meta mathematical study of the concept of mathematical truth after afred tarski coined the term theory of models in the early 1950 s it rapidly became one of the central most active branches of mathematical logic in the last few decades ideas that originated within model theory have provided powerful tools to solve problems in a variety of areas of classical mathematics including algebra combinatorics geometry number theory and banach space theory and operator theory the two volumes of beyond first order model theory present the reader with a fairly comprehensive vista rich in width and depth of some of the most active areas of contemporary research in model theory beyond the realm of the classical first order viewpoint each chapter is intended to serve both as an introduction to a current direction in model theory and as a presentation of results that are not available elsewhere all the articles are written so that they can be studied independently of one another this second volume contains introductions to real valued logic and applications abstract elementary classes and applications interconnections between model theory and function spaces nonstucture theory and model theory of second order logic features a coherent introduction to current trends in model theory contains articles by some of the most influential logicians of the last hundred years no other publication brings these distinguished authors together suitable as a reference for advanced undergraduate postgraduates and researchers material presented in the book e g abstract elementary classes first order logics with dependent sorts and applications of infinitary logics in set theory is not easily accessible in the current literature the various chapters in the book can be studied independently

Formal Logic 2006-03-15

this work presents a purely classical first order logical approach to the field of study in theoretical computer science sometimes referred to as the theory of programs or programming theory this field essentially attempts to provide a precise mathematical basis for the common activities involved in reasoning about computer programs and programming languages and it also attempts to find practical applications in the areas of program specification verification and programming language design many different approaches with different mathematical frameworks have been proposed as a basis for programming theory they differ in the mathe matical machinery they use to define and investigate programs and program properties and they also differ in the concepts they deal with to understand the programming paradigm different approaches use different tools and viewpoints to characterize the data environment of programs most of the approaches are related to mathe matical logic and they provide their own logic these logics however are very eclectic since they use special entities to reflect a special world of programs and also they are usually incomparable with each other this babel s mess irritated us and we decided to peel off the eclectic com ponents and try to answer all the questions by using classical first order logic

Handbook of Philosophical Logic 2012-12-06

using the theory of categories as a framework this book develops a duality theory for theories in first order logic in which the dual of a theory is the category of its models with suitable additional structure this duality theory resembles and generalizes m h stone s famous duality theory for boolean algebras as an application the author derives a result akin to the well known definability theorem of e w beth this new definability theorem is related to theorems of descent in category theory and algebra and can also be stated as a result in pure logic without reference to category theory containing novel techniques as well as applications of classical methods this carefuly written book shows an attention to both organization and detail and will appeal to mathematicians and philosophers interested in category theory

<u>Beyond First Order Model Theory, Volume II</u> *2023-07-03*

dependence is a common phenomenon wherever one looks ecological systems astronomy human history stock markets but what is the logic of dependence this book is the first to carry out a systematic logical study of this important concept giving on the way a precise mathematical treatment of hintikka s independence friendly logic dependence logic adds the concept of dependence to first order logic here the syntax and semantics of dependence logic are studied dependence logic is given an alternative game theoretic semantics and results about its complexity are proven this is a graduate textbook suitable for a special course in logic in mathematics philosophy and computer science departments and contains over 200 exercises many of which have a full solution at the end of the book it is also accessible to readers with a basic knowledge of logic interested in new phenomena in logic

First-Order Dynamic Logic *1979-04*

this book introduces the properties of conservative extensions of first order logic fol to new intensional first order logic ifol this extension allows for intensional semantics to be used for concepts thus affording new and more intelligent it systems insofar as it is conservative it preserves software applications and constitutes a fundamental advance relative to the current rdb databases big data with newsql constraint databases p2p systems and semantic applications moreover the many valued version of ifol can support the ai applications based on many valued logics

First-Order Programming Theories *2012-12-06*

this book provides a rigorous introduction to the basic concepts and results of contemporary logic it also presents in two unhurried chapters the mathematical tools mainly from set theory that are needed to master the technical aspects of the subject methods of definition and proof are also discussed at length with special emphasis on inductive definitions and proofs and recursive definitions the book is ideally suited for readers who want to undertake a serious study of logic but lack the mathematical background that other texts at this level presuppose it can be used as a textbook in graduate and advanced undergraduate courses in logic hundreds of exercises are provided topics covered include basic set theory propositional and first order syntax and semantics a sequent calculus style deductive system the soundness and completeness theorems cardinality the expressive limitations of first order logic with especial attention to the loewenheim skolem theorems and non standard models of arithmetic decidability complete theories categoricity and quantifier elimination

Duality and Definability in First Order Logic 2014-08-31

logic with trees is a new and original introduction to modern formal logic unlike most texts it also contains discussions on more philosophical issues such as truth conditionals and modal logic it presents the formal material with clarity preferring informal explanations and arguments to intimidatingly rigorous development worked examples and excercises enable the readers to check their progress logic with trees equips students with a complete and clear account of the truth tree system for first order logic the importance of logic and its relevance to many different disciplines the skills to grasp sophisticated formal reasoning techniques necessary to explore complex metalogic the ability to contest claims that ordinary reasoning is well represented by formal first order logic the issues covered include a thorough discussion of truth functional and full first order logic using the truth tree or semantic tableau approach completeness and soundness proofs are given for both truth functional and first order trees much use is made of induction which is presented in a clear and consistent manner there is also discussion of alternative deductive systems an introduction to transfinite numbers and categoricity the lowenhein skolem theories and the celebrated findings of godel and church the book concludes with an account of kripke s attempted solution of the liar paradox and a discussion of the weakness of truth functional account of conditionals particularly useful to those who favour critical accounts of formal reasoning it will be of interest to students of philosophy at first level and beyond and also students of mathematics and computer science

Dependence Logic *2007-05-10*

this book written by one of philosophy s pre eminent logicians argues that many of the basic assumptions common to logic philosophy of mathematics and metaphysics are in need of change it is therefore a book of critical importance to logical theory jaakko hintikka proposes a new basic first order logic and uses it to explore the foundations of mathematics this new logic enables logicians to express on the first order level such concepts as equicardinality infinity and truth in the same language the famous impossibility results by gödel and tarski that have dominated the field for the last sixty years turn out to be much less significant than has been thought all of ordinary mathematics can in principle be done on this first order level thus dispensing with the existence of sets and other higher order entities

Intensional First-Order Logic *2022-09-06*

a programming language based on a higher order logic provides a declarative approach to capturing computations involving types proofs and other syntactic structures

Introduction To The Theory Of Logic *2018-03-05*

Logic with Trees *2005-10-11*

Proof in Alonzo Church's and Alan Turing's Mathematical Logic: Undecidability of First Order Logic *1998-04-28*

The Principles of Mathematics Revisited *2012-06-11*

Programming with Higher-Order Logic