
Logic Wilfrid Hodges

Proof and Disproof in Formal Logic

The Incompleteness Phenomenon

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**Proof and Disproof in
Formal Logic** Cambridge
University Press
LogicPenguin UK

**The Incompleteness
Phenomenon** Oxford
University Press
Assuming no previous
study in logic, this
informal yet rigorous text
covers the material of a
standard undergraduate

first course in
mathematical logic, using
natural deduction and
leading up to the
completeness theorem for
first-order logic. At each
stage of the text, the
reader is given an
intuition based on
standard mathematical
practice, which is
subsequently developed
with clean formal
mathematics. Alongside
the practical examples,
readers learn what can
and can't be calculated;

for example the
correctness of a
derivation proving a given
sequent can be tested
mechanically, but there is
no general mechanical
test for the existence of a
derivation proving the
given sequent. The
undecidability results are
proved rigorously in an
optional final chapter,
assuming Matiyasevich's
theorem characterising
the computably
enumerable relations.
Rigorous proofs of the

adequacy and completeness proofs of the relevant logics are provided, with careful attention to the languages involved. Optional sections discuss the classification of mathematical structures by first-order theories; the required theory of cardinality is developed from scratch. Throughout the book there are notes on historical aspects of the material, and connections with linguistics and computer science, and the discussion of syntax and

semantics is influenced by modern linguistic approaches. Two basic themes in recent cognitive science studies of actual human reasoning are also introduced. Including extensive exercises and selected solutions, this text is ideal for students in Logic, Mathematics, Philosophy, and Computer Science.

Philosophy of Logic Wiley-Blackwell

In this volume, different aspects of logics for dependence and independence are

discussed, including both the logical and computational aspects of dependence logic, and also applications in a number of areas, such as statistics, social choice theory, databases, and computer security. The contributing authors represent leading experts in this relatively new field, each of whom was invited to write a chapter based on talks given at seminars held at the Schloss Dagstuhl Leibniz Center for Informatics in Wadern, Germany (in February 2013 and June 2015) and

an Academy Colloquium at the Royal Netherlands Academy of Arts and Sciences (March 2014). Altogether, these chapters provide the most up-to-date look at this developing and highly interdisciplinary field and will be of interest to a broad group of logicians, mathematicians, statisticians, philosophers, and scientists. Topics covered include a comprehensive survey of many propositional, modal, and first-order variants of dependence logic; new results

concerning expressive power of several variants of dependence logic with different sets of logical connectives and generalized dependence atoms; connections between inclusion logic and the least-fixed point logic; an overview of dependencies in databases by addressing the relationships between implication problems for fragments of statistical conditional independencies, embedded multivalued dependencies, and propositional logic;

various Markovian models used to characterize dependencies and causality among variables in multivariate systems; applications of dependence logic in social choice theory; and an introduction to the theory of secret sharing, pointing out connections to dependence and independence logic. OUP Oxford
The papers presented in this volume examine topics of central interest in contemporary philosophy of logic. They include reflections on the

nature of logic and its relevance for philosophy today, and explore in depth developments in informal logic and the relation of informal to symbolic logic, mathematical metatheory and the limiting metatheorems, modal logic, many-valued logic, relevance and paraconsistent logic, free logics, extensional v. intensional logics, the logic of fiction, epistemic logic, formal logical and semantic paradoxes, the concept of truth, the formal theory of

entailment, objectual and substitutional interpretation of the quantifiers, infinity and domain constraints, the Löwenheim-Skolem theorem and Skolem paradox, vagueness, modal realism v. actualism, counterfactuals and the logic of causation, applications of logic and mathematics to the physical sciences, logically possible worlds and counterpart semantics, and the legacy of Hilbert's program and logicism. The handbook is meant to be both a

compendium of new work in symbolic logic and an authoritative resource for students and researchers, a book to be consulted for specific information about recent developments in logic and to be read with pleasure for its technical acumen and philosophical insights. - Written by leading logicians and philosophers - Comprehensive authoritative coverage of all major areas of contemporary research in symbolic logic - Clear, in-depth expositions of technical detail -

Progressive organization from general considerations to informal to symbolic logic to nonclassical logics - Presents current work in symbolic logic within a unified framework - Accessible to students, engaging for experts and professionals - Insightful philosophical discussions of all aspects of logic - Useful bibliographies in every chapter
Building Models by Games
 Harvard University Press
 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.
Logic Birkhäuser
 'Tarski and Philosophy' shows the way to a proper understanding of the philosophical legacy of the great logician, philosopher and mathematician Alfred Tarski (1902-1983).
The Blackwell Guide to Philosophical Logic
 Springer
 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. [An Introduction to Formal Logic](#) Cambridge University Press
A paradox can be defined as an unacceptable conclusion derived by apparently acceptable reasoning from apparently acceptable premises. Many paradoxes raise serious philosophical problems, and they are

associated with crises of thought and revolutionary advances. The expanded and revised third edition of this intriguing book considers a range of knotty paradoxes including Zeno's paradoxical claim that the runner can never overtake the tortoise, a new chapter on paradoxes about morals, paradoxes about belief, and hardest of all, paradoxes about truth. The discussion uses a minimum of technicality but also grapples with complicated and difficult considerations, and is

accompanied by helpful questions designed to engage the reader with the arguments. The result is not only an explanation of paradoxes but also an excellent introduction to philosophical thinking.

The Development of Modern Logic Harvard University Press

This revised and considerably expanded 2nd edition brings together a wide range of topics, including modal, tense, conditional, intuitionist, many-valued, paraconsistent, relevant, and fuzzy logics. Part 1,

on propositional logic, is the old Introduction, but contains much new material. Part 2 is entirely new, and covers quantification and identity for all the logics in Part 1. The material is unified by the underlying theme of world semantics. All of the topics are explained clearly using devices such as tableau proofs, and their relation to current philosophical issues and debates are discussed. Students with a basic understanding of classical logic will find this book an invaluable introduction to

an area that has become of central importance in both logic and philosophy. It will also interest people working in mathematics and computer science who wish to know about the area.

Mathematical Logic

OUP Oxford

If a man supports Arsenal one day and Spurs the next then he is fickle but not necessarily illogical. From this starting point, and assuming no previous knowledge of logic, Wilfrid Hodges takes the reader through the whole gamut of logical expressions in a

simple and lively way. Readers who are more mathematically adventurous will find optional sections introducing rather more challenging material. 'A lively and stimulating book' *Philosophy and Model Theory* Courier Corporation
Contents include an elementary but thorough overview of mathematical logic of 1st order; formal number theory; surveys of the work by Church, Turing, and others, including Gödel's

completeness theorem, Gentzen's theorem, more.

A Course in Model Theory Springer Science & Business Media

This volume contains newly-commissioned articles covering the development of modern logic from the late medieval period (fourteenth century) through the end of the twentieth-century. It is the first volume to discuss the field with this breadth of coverage and depth. It will appeal to scholars and students of philosophical logic and the philosophy

of logic.

**Conference in
Mathematical Logic,
London'70. Edited by
Wilfrid Hodges** Oxford
University Press

Traditionally, logic has dealt with notions of truth and reasoning. In the past several decades, however, research focus in logic has shifted to the vast field of interactive logic—the domain of logics for both communication and interaction. The main applications of this move are logical approaches to games and social

software; the wealth of these applications was the focus of the seventh Augustus de Morgan Workshop in November 2005. This collection of papers from the workshop serves as the initial volume in the new series Texts in Logics and Games—touching on research in logic, mathematics, computer science, and game theory. “A wonderful demonstration of contemporary topics in logic.”—Wiebe van der Hoek, University of Liverpool

**New Essays on Tarski
and Philosophy**

Bloomsbury Publishing
Now much revised since its first appearance in 1941, this book, despite its brevity, is notable for its scope and rigor. It provides a single strand of simple techniques for the central business of modern logic. Basic formal concepts are explained, the paraphrasing of words into symbols is treated at some length, and a testing procedure is given for truth-function logic along with a complete

proof procedure for the logic of quantifiers. Fully one third of this revised edition is new, and presents a nearly complete turnover in crucial techniques of testing and proving, some change of notation, and some updating of terminology. The study is intended primarily as a convenient encapsulation of minimum essentials, but concludes by giving brief glimpses of further matters.

The Logic Manual

Penguin UK

The philosopher Abu Nasr

al-Farabi (c. 870-c. 950 CE) is a key Arabic intermediary figure. He knew Aristotle, and in particular Aristotle's logic, through Greek Neoplatonist interpretations translated into Arabic via Syriac and possibly Persian. For example, he revised a general description of Aristotle's logic by the 6th century Paul the Persian, and further influenced famous later philosophers and theologians writing in Arabic in the 11th to 12th centuries: Avicenna, Al-Ghazali, Avempace and

Averroes. Averroes' reports on Farabi were subsequently transmitted to the West in Latin translation. This book is an abridgement of Aristotle's *Prior Analytics*, rather than a commentary on successive passages. In it Farabi discusses Aristotle's invention, the syllogism, and aims to codify the deductively valid arguments in all disciplines. He describes Aristotle's categorical syllogisms in detail; these are syllogisms with premises such as 'Every A is a B' and 'No A is a B'.

He adds a discussion of how categorical syllogisms can codify arguments by induction from known examples or by analogy, and also some kinds of theological argument from perceived facts to conclusions lying beyond perception. He also describes post-Aristotelian hypothetical syllogisms, which draw conclusions from premises such as 'If P then Q' and 'Either P or Q'. His treatment of categorical syllogisms is one of the first to recognise logically

productive pairs of premises by using 'conditions of productivity', a device that had appeared in the Greek Philoponus in 6th century Alexandria. *Logic* Springer Science & Business Media
 Table of contents
Modal and Temporal Properties of Processes
 Logic
 This is an up-to-date textbook of model theory taking the reader from first definitions to Morley's theorem and the elementary parts of stability theory. Besides

standard results such as the compactness and omitting types theorems, it also describes various links with algebra, including the Skolem-Tarski method of quantifier elimination, model completeness, automorphism groups and omega-categoricity, ultraproducts, O-minimality and structures of finite Morley rank. The material on back-and-forth equivalences, interpretations and zero-one laws can serve as an introduction to applications of model

theory in computer science. Each chapter finishes with a brief commentary on the literature and suggestions for further reading. This book will benefit graduate students with an interest in model theory.

The Principles of Mathematics Revisited

Oxford University Press on Demand

A serious introductory treatment geared toward

non-logicians, this survey traces the development of mathematical logic from ancient to modern times and discusses the work of Planck, Einstein, Bohr, Pauli, Heisenberg, Dirac, and others. 1972 edition.

A Shorter Model Theory

Cambridge University Press

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

Logic Springer Science &

Business Media

This introduction to mathematical logic takes Gödel's incompleteness theorem as a starting point. It goes beyond a standard text book and should interest everyone from mathematicians to philosophers and general readers who wish to understand the foundations and limitations of modern mathematics.

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