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Set Theory and the Continuum Problem - Raymond M. Smullyan 2010
A lucid, elegant, and complete survey of set theory, this three-part treatment explores axiomatic set theory, the consistency of the continuum hypothesis, and forcing and independence results. 1996 edition.
Georg Cantor - Joseph Warren Dauben 2020-06-16
One of the greatest revolutions

in mathematics occurred when Georg Cantor (1845-1918) promulgated his theory of transfinite sets. This revolution is the subject of Joseph Dauben's important study—the most thorough yet written—of the philosopher and mathematician who was once called a "corrupter of youth" for an innovation that is now a vital component of elementary school curricula. Set theory has been widely adopted in mathematics and philosophy, but the controversy surrounding it at the turn of the century remains of great interest. Cantor's own faith in his theory was partly theological. His religious beliefs led him to expect paradoxes in any concept of the infinite, and he always retained his belief in the utter veracity of transfinite set theory. Later in his life, he was troubled by recurring attacks of severe depression. Dauben shows that these played an integral part in his understanding and defense of set theory.

A First Course in Topology - Robert A Conover 2014-05-21 Students must prove all of the theorems in this undergraduate-level text, which features extensive outlines to assist in study and comprehension. Thorough and well-written, the treatment provides sufficient material for a one-year undergraduate course. The logical presentation anticipates students' questions, and complete definitions and expositions of topics relate new concepts to previously discussed subjects. Most of the material focuses on point-set topology with the exception of the last chapter. Topics include sets and functions, infinite sets and transfinite numbers, topological spaces and basic concepts, product spaces, connectivity, and compactness. Additional subjects include separation axioms, complete spaces, and homotopy and the fundamental group. Numerous hints and figures illuminate the text. Dover (2014) republication of the edition originally published by The Williams & Wilkins Company,

Baltimore, 1975. See every Dover book in print at www.doverpublications.com

Geometric Group Theory - Clara Löh 2017-12-19 Inspired by classical geometry, geometric group theory has in turn provided a variety of applications to geometry, topology, group theory, number theory and graph theory. This carefully written textbook provides a rigorous introduction to this rapidly evolving field whose methods have proven to be powerful tools in neighbouring fields such as geometric topology. Geometric group theory is the study of finitely generated groups via the geometry of their associated Cayley graphs. It turns out that the essence of the geometry of such groups is captured in the key notion of quasi-isometry, a large-scale version of isometry whose invariants include growth types, curvature conditions, boundary constructions, and amenability. This book covers the foundations of quasi-geometry of groups at an advanced undergraduate level. The subject is illustrated by many elementary examples, outlooks on applications, as well as an extensive collection of exercises.

Axiomatic Set Theory - Patrick Suppes 2012-05-04 Geared toward upper-level undergraduates and graduate students, this treatment examines the basic paradoxes and history of set theory and advanced topics such as relations and functions, equipollence, more. 1960 edition.

Introduction to Graph Theory - Richard J. Trudeau 2013-04-15 Aimed at "the mathematically traumatized," this text offers nontechnical coverage of graph theory, with exercises. Discusses planar graphs, Euler's formula, Platonic graphs, coloring, the genus of a graph, Euler walks, Hamilton walks, more. 1976 edition.

Set Theory and the Continuum Hypothesis - Paul J. Cohen 2008-12-09 This exploration of a notorious mathematical problem is the work of the man who discovered the solution.

Written by an award-winning professor at Stanford University, it employs intuitive explanations as well as detailed mathematical proofs in a self-contained treatment. This unique text and reference is suitable for students and professionals. 1966 edition. Copyright renewed 1994.

Advanced Number Theory - Harvey Cohn 2012-05-04 Eminent mathematician/teacher approaches algebraic number theory from historical standpoint. Demonstrates how concepts, definitions, and theories have evolved during last two centuries. Features over 200 problems and specific theorems. Includes numerous graphs and tables.

Basic Set Theory - Azriel Levy 2012-06-11 The first part of this advanced-level text covers pure set theory, and the second deals with applications and advanced topics (point set topology, real spaces, Boolean algebras, infinite combinatorics and large cardinals). 1979 edition.

The Consistency of the Axiom of Choice and of the Generalized Continuum-hypothesis with the Axioms of Set Theory - Kurt Gödel 1940 Kurt Gödel, mathematician and logician, was one of the most influential thinkers of the twentieth century. Gödel fled Nazi Germany, fearing for his Jewish wife and fed up with Nazi interference in the affairs of the mathematics institute at the University of Göttingen. In 1933 he settled at the Institute for Advanced Study in Princeton, where he joined the group of world-famous mathematicians who made up its original faculty. His 1940 book, better known by its short title, The Consistency of the Continuum Hypothesis, is a classic of modern mathematics. The continuum hypothesis, introduced by mathematician George Cantor in 1877, states that there is no set of numbers between the integers and real numbers. It was later included as the first of mathematician David Hilbert's twenty-three unsolved math problems, famously delivered as a

manifesto to the field of mathematics at the International Congress of Mathematicians in Paris in 1900. In The Consistency of the Continuum Hypothesis Gödel set forth his proof for this problem. In 1999, Time magazine ranked him higher than fellow scientists Edwin Hubble, Enrico Fermi, John Maynard Keynes, James Watson, Francis Crick, and Jonas Salk. He is most renowned for his proof in 1931 of the 'incompleteness theorem,' in which he demonstrated that there are problems that cannot be solved by any set of rules or procedures. His proof wrought fruitful havoc in mathematics, logic, and beyond.

A Book of Set Theory - Charles C Pinter 2014-07-23 "This accessible approach to set theory for upper-level undergraduates poses rigorous but simple arguments. Each definition is accompanied by commentary that motivates and explains new concepts. A historical introduction is followed by discussions of classes and sets, functions, natural and cardinal numbers, the arithmetic of ordinal numbers, and related topics. 1971 edition with new material by the author"--
Concise Introduction to Logic and Set Theory - Iqbal H. Jebril 2021-09-30 This book deals with two important branches of mathematics, namely, logic and set theory. Logic and set theory are closely related and play very crucial roles in the foundation of mathematics, and together produce several results in all of mathematics. The topics of logic and set theory are required in many areas of physical sciences, engineering, and technology. The book offers solved examples and exercises, and provides reasonable details to each topic discussed, for easy understanding. The book is designed for readers from various disciplines where mathematical logic and set theory play a crucial role. The book will be of interested to students and instructors in engineering, mathematics,

computer science, and technology.

Continuum Mechanics - A. J. M. Spencer 2012-06-08 Undergraduate text offers an analysis of deformation and stress, covers laws of conservation of mass, momentum, and energy, and surveys the formulation of mechanical constitutive equations. 1992 edition.
PG MTM 201 B1 - DDE NBU 2019-11-05

An Adventurer's Guide to Number Theory - Richard Friedberg 2012-07-06 This witty introduction to number theory deals with the properties of numbers and numbers as abstract concepts. Topics include primes, divisibility, quadratic forms, and related theorems.
Topos Theory - P.T. Johnstone 2014-01-15 Focusing on topos theory's integration of geometric and logical ideas into the foundations of mathematics and theoretical computer science, this volume explores internal category theory, topologies and sheaves, geometric morphisms, and other subjects. 1977 edition.
Set Theory - Abhijit Dasgupta 2013-12-11
What is a number? What is infinity? What is continuity? What is order? Answers to these fundamental questions obtained by late nineteenth-century mathematicians such as Dedekind and Cantor gave birth to set theory. This textbook presents classical set theory in an intuitive but concrete manner. To allow flexibility of topic selection in courses, the book is organized into four relatively independent parts with distinct mathematical flavors. Part I begins with the Dedekind–Peano axioms and ends with the construction of the real numbers. The core Cantor–Dedekind theory of cardinals, orders, and ordinals appears in Part II. Part III focuses on the real continuum. Finally, foundational issues and formal axioms are introduced in Part IV. Each part ends with a postscript chapter discussing topics beyond the scope of the

main text, ranging from philosophical remarks to glimpses into landmark results of modern set theory such as the resolution of Lusin's problems on projective sets using determinacy of infinite games and large cardinals. Separating the metamathematical issues into an optional fourth part at the end makes this textbook suitable for students interested in any field of mathematics, not just for those planning to specialize in logic or foundations. There is enough material in the text for a year-long course at the upper-undergraduate level. For shorter one-semester or one-quarter courses, a variety of arrangements of topics are possible. The book will be a useful resource for both experts working in a relevant or adjacent area and beginners wanting to learn set theory via self-study.

Set Theory And Its Applications In Physics And Computing - Yair Shapira 2022-06-24
Why learn set theory? This book provides the answer — it is interesting, and also useful! Taking a new approach and looking from a fresh perspective, the discussion flows in a friendly and transparent way, supplemented with a lot of examples and figures. This makes the theory easily comprehensible: the proofs get vivid and visual, enveloped with interesting applications for students in (applied) math, physics, and engineering. Given the theory and the applications, the book could serve as a textbook in four (undergraduate) math courses: Introduction to set theory and its application; Chaos theory and stability — a geometrical point of view; Functional analysis — Han-Banach theory; and Cryptography with quantum computing. It teaches set theory from the basics, including the axiom of choice, the well ordering theorem, and Zorn's lemma. Furthermore, it uses Cantor's set to introduce chaos theory from a geometrical point of view. Moreover, it introduces the

binomial formula (and other related formulas), and uses them in quantum statistical mechanics. And finally, it uses Zorn's lemma in functional analysis, general relativity, and quantum mechanics. There are also practical applications in cryptography, error correction, quantum computing and programming.

What Is Mathematical Logic? - J. N. Crossley 2012-08-29 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.

Contributions to the Founding of the Theory of Transfinite Numbers - Georg Cantor 1911

A Beginner's Guide to Mathematical Logic - Raymond M. Smullyan 2014-07-23 Written by a creative master of mathematical logic, this introductory text combines stories of great philosophers, quotations, and riddles with the fundamentals of mathematical logic. Author Raymond Smullyan offers clear, incremental presentations of difficult logic concepts. He highlights each subject with inventive explanations and unique problems. Smullyan's accessible narrative provides memorable examples of concepts related to proofs, propositional logic and first-order logic, incompleteness theorems, and incompleteness proofs. Additional topics include undecidability, combinatoric logic, and recursion theory. Suitable for undergraduate and graduate courses, this book will also amuse and enlighten mathematically minded readers. Dover (2014) original publication. See every Dover book in print at www.doverpublications.com Consistency of the Continuum Hypothesis. (AM-3), Volume 3 - Kurt Gödel 2016-03-02 Kurt Gödel, mathematician and logician, was one of the most influential thinkers of the twentieth century. Gödel fled

Nazi Germany, fearing for his Jewish wife and fed up with Nazi interference in the affairs of the mathematics institute at the University of Göttingen. In 1933 he settled at the Institute for Advanced Study in Princeton, where he joined the group of world-famous mathematicians who made up its original faculty. His 1940 book, better known by its short title, The Consistency of the Continuum Hypothesis, is a classic of modern mathematics. The continuum hypothesis, introduced by mathematician George Cantor in 1877, states that there is no set of numbers between the integers and real numbers. It was later included as the first of mathematician David Hilbert's twenty-three unsolved math problems, famously delivered as a manifesto to the field of mathematics at the International Congress of Mathematicians in Paris in 1900. In The Consistency of the Continuum Hypothesis Gödel set forth his proof for this problem. In 1999, Time magazine ranked him higher than fellow scientists Edwin Hubble, Enrico Fermi, John Maynard Keynes, James Watson, Francis Crick, and Jonas Salk. He is most renowned for his proof in 1931 of the 'incompleteness theorem,' in which he demonstrated that there are problems that cannot be solved by any set of rules or procedures. His proof wrought fruitful havoc in mathematics, logic, and beyond.
Zermelo's Axiom of Choice - G.H. Moore 2012-12-06 This book grew out of my interest in what is common to three disciplines: mathematics, philosophy, and history. The origins of Zermelo's Axiom of Choice, as well as the controversy that it engendered, certainly lie in that intersection. Since the time of Aristotle, mathematics has been concerned alternately with its assumptions and with the objects, such as number and space, about which those assumptions were made. In the historical context of Zermelo's Axiom, I have explored both the vagaries and the fertility of

this alternating concern. Though Zermelo's research has provided the focus for this book, much of it is devoted to the problems from which his work originated and to the later developments which, directly or indirectly, he inspired. A few remarks about format are in order. In this book a publication is indicated by a date after a name; so Hilbert 1926, 178 refers to page 178 of an article written by Hilbert, published in 1926, and listed in the bibliography. Set Theoretical Aspects of Real Analysis - Alexander B. Kharazishvili 2014-08-26 Set Theoretical Aspects of Real Analysis is built around a number of questions in real analysis and classical measure theory, which are of a set theoretic flavor. Accessible to graduate students, and researchers the beginning of the book presents introductory topics on real analysis and Lebesgue measure theory. These topics highlight the boundary between fundamental concepts of measurability and nonmeasurability for point sets and functions. The remainder of the book deals with more specialized material on set theoretical real analysis. The book focuses on certain logical and set theoretical aspects of real analysis. It is expected that the first eleven chapters can be used in a course on Lebesque measure theory that highlights the fundamental concepts of measurability and non-measurability for point sets and functions. Provided in the book are problems of varying difficulty that range from simple observations to advanced results. Relatively difficult exercises are marked by asterisks and hints are included with additional explanation. Five appendices are included to supply additional background information that can be read alongside, before, or after the chapters. Dealing with classical concepts, the book highlights material not often found in analysis courses. It lays out, in a logical, systematic manner, the foundations of set theory providing a readable treatment accessible to graduate students

and researchers.

Popular Lectures on Mathematical Logic - Hao Wang 2014-09-22
Noted logician discusses both theoretical underpinnings and practical applications, exploring set theory, model theory, recursion theory and constructivism, proof theory, logic's relation to computer science, and other subjects. 1981 edition, reissued by Dover in 1993 with a new Postscript by the author.

The Axiom of Choice - Thomas J. Jech 2008-01-01
Comprehensive and self-contained text examines the axiom's relative strengths and consequences, including its consistency and independence, relation to permutation models, and examples and counterexamples of its use. 1973 edition.

The Continuum - Hermann Weyl 1994-01-01
Concise classic by great mathematician and physicist deals with logic and mathematics of set and function, concept of number and the continuum.

Bibliography. Originally published 1918.

Logic, Mathematics, and Computer Science - Yves Nievergelt 2015-10-13
This text for the first or second year undergraduate in mathematics, logic, computer science, or social sciences, introduces the reader to logic, proofs, sets, and number theory. It also serves as an excellent independent study reference and resource for instructors. Adapted from Foundations of Logic and Mathematics: Applications to Science and Cryptography © 2002 Birkhäuser, this second edition provides a modern introduction to the foundations of logic, mathematics, and computers science, developing the theory that demonstrates construction of all mathematics and theoretical computer science from logic and set theory. The focuses is on foundations, with specific statements of all the associated axioms and rules of logic and set theory, and provides complete details and derivations of formal proofs.

Copious references to literature that document historical development is also provided. Answers are found to many questions that usually remain unanswered: Why is the truth table for logical implication so unintuitive? Why are there no recipes to design proofs? Where do these numerous mathematical rules come from? What issues in logic, mathematics, and computer science still remain unresolved? And the perennial question: In what ways are we going to use this material? Additionally, the selection of topics presented reflects many major accomplishments from the twentieth century and includes applications in game theory and Nash's equilibrium, Gale and Shapley's match making algorithms, Arrow's Impossibility Theorem in voting, to name a few. From the reviews of the first edition: "...All the results are proved in full detail from first principles...remarkably, the arithmetic laws on the rational numbers are proved, step after step, starting from the very definitions!...This is a valuable reference text and a useful companion for anybody wondering how basic mathematical concepts can be rigorously developed within set theory." —MATHEMATICAL REVIEWS "Rigorous and modern in its theoretical aspect, attractive as a detective novel in its applied aspects, this paper book deserves the attention of both beginners and advanced students in mathematics, logic and computer sciences as well as in social sciences." —Zentralblatt MATH

Universality in Set Theories - Manuel Bremer 2013-05-02 The book discusses the fate of universality and a universal set in several set theories. The book aims at a philosophical study of ontological and conceptual questions around set theory. Set theories are ontologies. They posit sets and claim that these exhibit the essential properties laid down in the set theoretical axioms. Collecting these postulated entities quantified over poses the problem of universality. Is

the collection of the set theoretical entities itself a set theoretical entity? What does it mean if it is, and what does it mean if it is not? To answer these questions involves developing a theory of the universal set. We have to ask: Are there different aspects to universality in set theory, which stand in conflict to each other? May inconsistency be the price to pay to circumvent ineffability? And most importantly: How far can axiomatic ontology take us out of the problems around universality?

Classic Set Theory - D.C. Goldrei 2017-09-06 Designed for undergraduate students of set theory, Classic Set Theory presents a modern perspective of the classic work of Georg Cantor and Richard Dedekin and their immediate successors. This includes:The definition of the real numbers in terms of rational numbers and ultimately in terms of natural numbersDefining natural numbers in terms of setsThe potential paradoxes in set theoryThe Zermelo-Fraenkel axioms for set theoryThe axiom of choiceThe arithmetic of ordered setsCantor's two sorts of transfinite number - cardinals and ordinals - and the arithmetic of these.The book is designed for students studying on their own, without access to lecturers and other reading, along the lines of the internationally renowned courses produced by the Open University. There are thus a large number of exercises within the main body of the text designed to help students engage with the subject, many of which have full teaching solutions. In addition, there are a number of exercises without answers so students studying under the guidance of a tutor may be assessed.Classic Set Theory gives students sufficient grounding in a rigorous approach to the revolutionary results of set theory as well as pleasure in being able to tackle significant problems that arise from the theory.

A Beginner's Guide to Mathematical Logic - Raymond

M. Smullyan 2014-03-19 Combining stories of great writers and philosophers with quotations and riddles, this completely original text for first courses in mathematical logic examines problems related to proofs, propositional logic and first-order logic, undecidability, and other topics. 2013 edition.

Philosophical Introduction to Set Theory - Stephen Pollard 2015-07-20 This unique approach maintains that set theory is the primary mechanism for ideological and theoretical unification in modern mathematics, and its technically informed discussion covers a variety of philosophical issues. 1990 edition.

Contradictions, from Consistency to Inconsistency - Walter Carnielli 2018-10-13 This volume investigates what is beyond the Principle of Non-Contradiction. It features 14 papers on the foundations of reasoning, including logical systems and philosophical considerations. Coverage brings together a cluster of issues centered upon the variety of meanings of consistency, contradiction, and related notions. Most of the papers, but not all, are developed around the subtle distinctions between consistency and non-contradiction, as well as among contradiction, inconsistency, and triviality, and concern one of the above mentioned threads of the broadly understood non-contradiction principle and the related principle of explosion. Some others take a perspective that is not too far away from such themes, but with the freedom to tread new paths. Readers should understand the title of this book in a broad way,because it is not so obvious to deal with notions like contradictions, consistency, inconsistency, and triviality. The papers collected here present groundbreaking ideas related to consistency and inconsistency.

Vision in Elementary Mathematics - W. W. Sawyer 2012-09-26

Sure-fire techniques of visualizing, dramatizing, and analyzing numbers promise to attract and retain students' attention and understanding. Topics include basic multiplication and division, algebra, word problems, graphs, negative numbers, fractions, many other practical applications of elementary mathematics. 1964 ed. Answers to Problems.

The Historical Roots of Elementary Mathematics - Lucas N. H. Bunt 2012-12-11 Exciting, hands-on approach to understanding fundamental underpinnings of modern arithmetic, algebra, geometry and number systems examines their origins in early Egyptian, Babylonian, and Greek sources. *The Gödelian Puzzle Book* - Raymond M. Smullyan 2013-08-21 These logic puzzles provide entertaining variations on Gödel's incompleteness theorems, offering ingenious challenges related to infinity, truth and provability, undecidability, and other concepts. No background in formal logic necessary.

Kurt Gödel and the Foundations of Mathematics - Matthias Baaz 2011-06-06 This volume commemorates the life, work and foundational views of Kurt Gödel (1906–78), most famous for his hallmark works on the completeness of first-order logic, the incompleteness of number theory, and the consistency - with the other widely accepted axioms of set theory - of the axiom of choice and of the generalized continuum hypothesis. It explores current research, advances and ideas for future directions not only in the foundations of mathematics and logic, but also in the fields of computer science, artificial intelligence, physics, cosmology, philosophy, theology and the history of science. The discussion is supplemented by personal reflections from several scholars who knew Gödel personally, providing some interesting insights into his life. By putting his ideas and life's work into the context of current thinking and

perceptions, this book will extend the impact of Gödel's fundamental work in mathematics, logic, philosophy and other disciplines for future generations of researchers.

Curvature in Mathematics and Physics - Shlomo Sternberg 2013-04-17 Expert treatment introduces semi-Riemannian geometry and its principal physical application, Einstein's theory of general relativity, using the Cartan exterior calculus as a principal tool. Prerequisites include linear algebra and advanced calculus. 2012 edition.

Analysis in Euclidean Space - Kenneth Hoffman 2019-07-17 Developed for an introductory course in mathematical analysis at MIT, this text focuses on concepts, principles, and methods. Its introductions to real and complex analysis are closely formulated, and they constitute a natural introduction to complex function theory. Starting with an overview of the real number system, the text presents results for subsets and functions related to Euclidean space of n dimensions. It offers a rigorous review of the fundamentals of calculus, emphasizing power series expansions and introducing the theory of complex-analytic functions. Subsequent chapters cover sequences of functions, normed linear spaces, and the Lebesgue interval. They discuss most of the basic properties of integral and measure, including a brief look at orthogonal expansions. A chapter on differentiable mappings addresses implicit and inverse function theorems and the change of variable theorem. Exercises appear throughout the book, and extensive supplementary material includes a Bibliography, List of Symbols, Index, and an Appendix with background in elementary set theory.

Iconicity and Abduction - Gianluca Caterina 2016-09-13 This book consolidates and extends the authors' work on the connection between iconicity and abductive inference. It emphasizes a

pragmatic, experimental and fallibilist view of knowledge without sacrificing formal rigor. Within this context, the book focuses particularly on scientific knowledge and its prevalent use of mathematics. To find an answer to the question "What kind of experimental activity is the scientific employment of mathematics?" the book addresses the problems involved in formalizing abductive cognition. For this, it implements the concept and method of iconicity, modeling this theoretical framework mathematically through category theory and topoi. Peirce's concept of iconic signs is treated in depth, and it is shown how Peirce's diagrammatic logical notation of Existential Graphs makes use of iconicity and how important features of this iconicity are representable within category theory. Alain Badiou's set-theoretical model of truth procedures and his relational sheaf-based theory of phenomenology are then integrated within the Peircean logical context. Finally, the book opens the path towards a more naturalist interpretation of the abductive models developed in Peirce and Badiou through an analysis of several recent attempts to reformulate quantum mechanics with categorical methods. Overall, the book offers a comprehensive and rigorous overview of past approaches to iconic semiotics and abduction, and it encompasses new extensions of these methods towards an innovative naturalist interpretation of abductive reasoning.