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KEY=A - SHEPPARD TRISTEN

The Pea and the Sun

A Mathematical Paradox

CRC Press **Take an apple and cut it into five pieces. Would you believe that these five pieces can be reassembled in such a fashion so as to create two apples equal in shape and size to the original? Would you believe that you could make something as large as the sun by breaking a pea into a finite number of pieces and putting it back together again? Neither did Leonard Wapner, author of The Pea and the Sun, when he was first introduced to the Banach-Tarski paradox, which asserts exactly such a notion. Written in an engaging style, The Pea and the Sun catalogues the people, events, and mathematics that contributed to the discovery of Banach and Tarski's magical paradox. Wapner makes one of the most interesting problems of advanced mathematics accessible to the non-mathematician.**

On the Brink of Paradox

Highlights from the Intersection of Philosophy and Mathematics

MIT Press **An introduction to awe-inspiring ideas at the brink of paradox: infinities of different sizes, time travel, probability and measure theory, and computability theory. This book introduces the reader to awe-inspiring issues at the intersection of philosophy and mathematics. It explores ideas at the brink of paradox: infinities of different sizes, time travel, probability and measure theory, computability theory, the Grandfather Paradox, Newcomb's Problem, the Principle of Countable Additivity. The goal is to present some exceptionally beautiful ideas in enough detail to enable readers to understand the ideas themselves (rather than watered-down approximations), but without supplying so much detail that they abandon the effort. The philosophical content requires a mind attuned to subtlety; the most demanding of the mathematical ideas require familiarity with college-level mathematics or mathematical proof. The book covers Cantor's revolutionary thinking about infinity, which leads to the result that some infinities are bigger than others; time travel and free will, decision theory, probability, and the Banach-Tarski Theorem, which states that it is possible to decompose a ball into a finite number of pieces and reassemble the pieces so as to get two balls that are each the same size as the original. Its investigation of computability theory leads to a proof of Gödel's Incompleteness Theorem, which yields the amazing result that arithmetic is so complex that no computer could be programmed to output every arithmetical truth and no falsehood. Each chapter is followed by an appendix with answers to exercises. A list of recommended reading points readers to more advanced discussions. The book is based on a popular course (and MOOC) taught by the author at MIT.**

Paradoxes

Guiding Forces in Mathematical Exploration

Curious Math Publications **Does .999?=1? Can you cut and reassemble a sphere into two identically sized spheres? Is the consistency of mathematical systems unprovable? Surprisingly, the answer to all of these questions is yes! And at the heart of each question, there lies paradox. For millennia, paradoxes have shaped mathematics and guided mathematical progress forwards. From the ancient paradoxes of Zeno to the modern paradoxes of Russell, paradoxes remind us of the constant need to revamp our mathematical understanding. It is for this reason that paradoxes are so important. Paradoxes: Guiding Forces in Mathematical Exploration provides a survey of mathematical paradoxes spanning a wide variety of topics. It delves into each paradox mathematically, philosophically, and historically, and attempts to provide a full picture of how paradoxes contributed to the progress of mathematics and guided it in many ways. In addition, it discusses how paradoxes can be useful as educational tools. All of that, plus the fact that it is written in a way that is accessible to anyone with a high school background in mathematics! Entertaining and educational, this book will appeal to any reader looking for a mathematical and philosophical challenge.**

Riddles in Mathematics

A Book of Paradoxes

Courier Corporation **"Math enthusiasts of all ages will delight in this collection of more than 200 riddles drawn from every mathematical discipline. Only an elementary background is needed to enjoy and solve the tremendous variety of puzzles, which include riddles based on geometry, trigonometry, algebra, infinity, probability, and logic. Includes complete solutions and 113 illustrations"--**

Paradoxes in Probability Theory and Mathematical Statistics

Springer **It isn't that they can't see the solution. Approach your problems from the right end and begin with the answers. It is that they can't see the problem. Then one day, perhaps you will find G. K. Chesterton. The Scandal of the final question. Father Brown 'The point of a Pin'. 'The Hermit Clad in Crane Feathers' in R. van Gulik's The Chinese Maze Murders. Growing specialization and diversification have brought a host of mono graphs and textbooks on increasingly specialized topics. However, the "tree" of knowledge of mathematics and related fields does not grow only by putting forth new branches. It also happens, quite often in fact, that branches which were thought to be completely disparate are suddenly seen to be related. Further, the kind and level of sophistication of mathematics applied in various sciences has changed drastically in recent years: measure theory is used (nontrivially) in regional and theoretical economics; algebraic geometry interacts with physics; the Minkowski lemma, coding theory and the structure of water meet one another in packing and covering theory; quantum fields, crystal defects and mathematical programming profit from homotopy theory; Lie algebras are relevant to filtering; and prediction and electrical engineering can use Stein spaces. And in addition to this there are such new emerging subdisciplines as "experi mental mathematics", "CFD", "completely integrable systems", "chaos, synergetics and large-scale order", which are almost impossible to fit into the existing classification schemes.**

The Banach–Tarski Paradox

Cambridge University Press **The Banach-Tarski Paradox seems patently false. The authors explain it and its implications in terms appropriate for an undergraduate.**

How Mathematicians Think

Using Ambiguity, Contradiction, and Paradox to Create Mathematics

Princeton University Press **To many outsiders, mathematicians appear to think like computers, grimly grinding away with a strict formal logic and moving methodically--even algorithmically--from one black-and-white deduction to another. Yet mathematicians often describe their most important breakthroughs as creative, intuitive responses to ambiguity, contradiction, and paradox. A unique examination of this less-familiar aspect of mathematics, How Mathematicians Think reveals that mathematics is a profoundly creative activity and not just a body of formalized rules and results. Nonlogical qualities, William Byers shows, play an essential role in mathematics. Ambiguities, contradictions, and paradoxes can arise when ideas developed in different contexts come into contact. Uncertainties and conflicts do not impede but rather spur the development of mathematics. Creativity often means bringing apparently incompatible perspectives together as complementary aspects of a new, more subtle theory. The secret of mathematics is not to be found only in its logical structure. The creative dimensions of mathematical work have great implications for our notions of mathematical and scientific truth, and How Mathematicians Think provides a novel approach to many fundamental questions. Is mathematics objectively true? Is it discovered or invented? And is there such a thing as a "final" scientific theory? Ultimately, How Mathematicians Think shows that the nature of mathematical thinking can teach us a great deal about the human condition itself.**

Infinity, Causation, and Paradox

Oxford University Press **Infinity is paradoxical in many ways. Some paradoxes involve deterministic supertasks, such as Thomson's Lamp, where a switch is toggled an infinite number of times over a finite period of time, or the Grim Reaper, where it seems that infinitely many reapers can produce a result without doing anything. Others involve infinite lotteries. If you get two tickets from an infinite fair lottery where tickets are numbered from 1, no matter what number you saw on the first ticket, it is almost certain that the other ticket has a bigger number on it. And others center on paradoxical results in decision theory, such as the surprising observation that if you perform a sequence of fair coin flips that goes infinitely far back into the past but only finitely into the future, you can leverage information about past coin flips to predict future ones with only finitely many mistakes. Alexander R. Pruss examines this seemingly large family of paradoxes in Infinity, Causation and Paradox. He establishes that these paradoxes and numerous others all have a common structure: their most natural embodiment involves an infinite number of items causally impinging on a single output. These paradoxes, he argues, can all be resolved by embracing 'causal finitism', the view that it is impossible for a single output to have an infinite causal history. Throughout the book, Pruss exposits such paradoxes, defends causal finitism at length, and considers connections with the philosophy of physics (where causal finitism favors but does not require discretist theories of space and time) and the philosophy of religion (with a cosmological argument for a first cause).**

Paradoxes in Mathematics

Courier Corporation **Students and puzzle enthusiasts will get plenty of enjoyment plus some painless mathematical instruction from 28 conundrums, including The Curve That Shook the World, Space Travel in a Wineglass, and Through Cantor's Looking Glass.**

New Essays on the Knowability Paradox

OUP Oxford **In 1945 Alonzo Church issued a pair of referee reports in which he anonymously conveyed to Frederic Fitch a surprising proof showing that wherever there is (empirical) ignorance there is also logically unknowable truth. Fitch published this and a generalization of the result in 1963. Ever since, philosophers have been attempting to understand the significance and address the counter-intuitiveness of this, the so-called paradox of knowability. This collection assembles Church's referee reports, Fitch's 1963 paper, and nineteen new papers on the knowability paradox. The contributors include logicians and philosophers from three continents, many of whom have already made important contributions to the discussion of the problem. The volume contains a general introduction to the paradox and the background literature, and is divided into seven sections that roughly mark the central points of debate. The sections include the history of the paradox, Michael Dummett's constructivism, issues of paraconsistency, developments of modal and temporal logics,**

Cartesian restricted theories of truth, modal and mathematical fictionalism, and reconsiderations about how, and whether, we ought to construe an anti-realist theory of truth.

Incompleteness: The Proof and Paradox of Kurt Gödel (Great Discoveries)

W. W. Norton & Company **A portrait of the eminent twentieth-century mathematician discusses his theorem of incompleteness, relationships with such contemporaries as Albert Einstein, and untimely death as a result of mental instability and self-starvation.**

The Banach-Tarski Paradox

Cambridge University Press **Asserting that a solid ball may be taken apart into many pieces that can be rearranged to form a ball twice as large as the original, the Banach-Tarski paradox is examined in relationship to measure and group theory, geometry and logic.**

Sleight of Mind

75 Ingenious Paradoxes in Mathematics, Physics, and Philosophy

MIT Press **Exploring more than seventy-five well-known paradoxes in mathematics, philosophy, physics, and the social sciences showing how reason and logic can dispel the illusion of contradiction. Paradox is a sophisticated kind of magic trick. A magician's purpose is to create the appearance of impossibility, to pull a rabbit from an empty hat. Yet paradox doesn't require tangibles, like rabbits or hats. Paradox works in the abstract, with words and concepts and symbols, to create the illusion of contradiction. There are no contradictions in reality, but there can appear to be. In Sleight of Mind, Matt Cook and a few collaborators dive deeply into more than 75 paradoxes in mathematics, physics, philosophy, and the social sciences. As each paradox is discussed and resolved, Cook helps readers discover the meaning of knowledge and the proper formation of concepts—and how reason can dispel the illusion of contradiction. The journey begins with “a most ingenious paradox” from Gilbert and Sullivan's Pirates of Penzance. Readers will then travel from Ancient Greece to cutting-edge laboratories, encounter infinity and its different sizes, and discover mathematical impossibilities inherent in elections. They will tackle conundrums in probability, induction, geometry, and game theory; perform “supertasks”; build apparent perpetual motion machines; meet twins living in different millennia; explore the strange quantum world—and much more.**

Paradoxes and Inconsistent Mathematics

Cambridge University Press **Why are there paradoxes? This book uses paraconsistent logic to develop the mathematics to find out.**

Puzzles, Paradoxes, and Problem Solving

An Introduction to Mathematical Thinking

CRC Press **A Classroom-Tested, Alternative Approach to Teaching Math for Liberal Arts Puzzles, Paradoxes, and Problem Solving: An Introduction to Mathematical Thinking uses puzzles and paradoxes to introduce basic principles of mathematical thought. The text is designed for students in liberal arts mathematics courses. Decision-making situations that progress from recreational problems to important contemporary applications develop the critical-thinking skills of non-science and non-technical majors. The logical underpinnings of this textbook were developed and refined throughout many years of classroom feedback and in response to commentary from presentations at national conferences. The text’s five units focus on graphs, logic, probability, voting, and cryptography. The authors also cover related areas, such as operations research, game theory, number theory, combinatorics, statistics, and circuit design. The text uses a core set of common representations, strategies, and algorithms to analyze diverse games, puzzles, and applications.**

This unified treatment logically connects the topics with a recurring set of solution approaches. Requiring no mathematical prerequisites, this book helps students explore creative mathematical thinking and enhance their own critical-thinking skills. Students will acquire quantitative literacy and appreciation of mathematics through the text’s unified approach and wide range of interesting applications.

Mathematical Fallacies and Paradoxes

Courier Corporation **Stimulating, thought-provoking analysis of the most interesting intellectual inconsistencies in mathematics, physics, and language, including being led astray by algebra (De Morgan's paradox). 1982 edition.**

A Mathematical Paradox in Physics?

The Mathematical Paradoxes

Oppositions and Paradoxes

Philosophical Perplexities in Science and Mathematics

Broadview Press **Since antiquity, opposed concepts such as the One and the Many, the Finite and the Infinite, and the Absolute and the Relative, have been a driving force in philosophical, scientific, and mathematical thought. Yet they have also given rise to perplexing problems and conceptual paradoxes which continue to haunt scientists and philosophers. In Oppositions and Paradoxes, John L. Bell explains and investigates the paradoxes and puzzles that arise out of conceptual oppositions in physics and mathematics. In the process, Bell not only motivates abstract conceptual thinking about the paradoxes at issue, but he also offers a compelling introduction to central ideas in such otherwise-difficult topics as non-Euclidean geometry, relativity, and quantum physics. These paradoxes are often as fun as they are flabbergasting. Consider, for example, the famous Tristram Shandy paradox: an immortal man composing an autobiography so slowly as to require a year of writing to describe each day of his life — he would, if he had infinite time, presumably never complete the work, although no individual part of it would remain unwritten. Or think of an office mailbox labelled “mail for those with no mailbox”—if this is a person’s mailbox, how can they possibly have “no mailbox”? These and many other paradoxes straddle the boundary between physics and metaphysics, and demonstrate the hidden difficulty in many of our most basic concepts.**

Puzzles, Paradoxes, and Problem Solving

An Introduction to Mathematical Thinking

CRC Press **A Classroom-Tested, Alternative Approach to Teaching Math for Liberal Arts Puzzles, Paradoxes, and Problem Solving: An Introduction to Mathematical Thinking uses puzzles and paradoxes to introduce basic principles of mathematical thought. The text is designed for students in liberal arts mathematics courses. Decision-making situations that progress**

Principia Mathematica

Cambridge University Press **Principia Mathematica was first published in 1910-13; this is the ninth impression of the second edition of 1925-7. The Principia has long been recognised as one of the intellectual landmarks of the century. It was the first book to show clearly the close relationship between mathematics and formal logic. Starting from a minimal number of axioms, Whitehead and Russell display the structure of both kinds of thought. No other book has had such an influence on the subsequent history of mathematical philosophy.**

Circularity

A Common Secret to Paradoxes, Scientific Revolutions and Humor

World Scientific **"Circularity" is the story of a Janus-faced conceptual structure, that on the one hand led to deep scientific discoveries, and on the other hand is used to trick the mind into believing the impossible. Alongside mathematical revolutions that eventually led to the invention of the computer, the book describes ancient paradoxes that arise from circular thinking. Another aspect of circularity, its ability to entertain, leads to a surprising insight on the time old question "What is humor". The book presents the ubiquity of circularity in many fields, and its power to confuse and to instruct. See Press Release: Vicious circles -- confusing, instructive, amusing? Contents:The Dark Side — Paradoxes:MagicFree WillThe Mind–Body ProblemThe Illuminated Side — Scientific Breakthroughs:Large Infinities and Still Larger OnesGödel's Incompleteness TheoremTuring Invents the ComputerFor the Experienced Hikers Readership: Researchers in mathematics, philosophy and general public.**

A Cultural History of Reforming Math for All

The Paradox of Making In/equality

Routledge **While many accept that math is a universal, culturally indifferent subject in school, this book demonstrates that this is anything but true. Building off of a historically conscious understanding of school reform, Diaz makes the case that the language of mathematics, and the symbols through which it is communicated, is not merely about the alleged cultural indifference of mathematical thinking; rather, mathematical teaching relates to historical, cultural, political, and social understandings of equality that order who the child is and should be. Focusing on elementary math for all education reforms in America since the mid-twentieth century, Diaz offers an alternative way of thinking about the subject that recognizes the historical making of contemporary notions of inequality and difference.**

Unexpected Expectations

The Curiosities of a Mathematical Crystal Ball

CRC Press **Unexpected Expectations: The Curiosities of a Mathematical Crystal Ball explores how paradoxical challenges involving mathematical expectation often necessitate a reexamination of basic premises. The author takes you through mathematical paradoxes associated with seemingly straightforward applications of mathematical expectation and shows how these unexpected contradictions may push you to reconsider the legitimacy of the applications. The book requires only an understanding of basic algebraic operations and includes supplemental mathematical background in chapter appendices. After a history of probability theory, it introduces the basic laws of probability as well as the definition and applications of mathematical expectation/expected value (E). The remainder of the text covers unexpected results related to mathematical expectation, including: The roles of aversion and risk in rational decision making A class of expected value paradoxes referred to as envelope problems Parrondo's paradox—how negative (losing) expectations can be combined to give a winning result Problems associated with imperfect recall Non-zero-sum games, such as the game of chicken and the prisoner's dilemma Newcomb's paradox—a**

great philosophical paradox of free will Benford’s law and its use in computer design and fraud detection While useful in areas as diverse as game theory, quantum mechanics, and forensic science, mathematical expectation generates paradoxes that frequently leave questions unanswered yet reveal interesting surprises. Encouraging you to embrace the mysteries of mathematics, this book helps you appreciate the applications of mathematical expectation, "a statistical crystal ball." Listen to an interview with the author on NewBooksinMath.com.

Mathematical Paradoxes and Recreations for Teachers and Students of High School Mathematics

One Hundred Years of Russell´s Paradox

Mathematics, Logic, Philosophy

Walter de Gruyter **Die in diesem Band zusammengefassten Beiträge stellen die wesentlichen Forschungsergebnisse der internationalen Münchner Konferenz "100 Jahre Russell-Paradoxon" im Jahr 2001 dar, auf der an die Entdeckung des berühmten Russell Paradoxons vor 100 Jahren erinnert wurde. Die 31 Beiträge und der Einführungsessay des Herausgebers wurden alle - bis auf zwei Ausnahmen - ursprünglich für diesen Band verfasst.**

Frege and Other Philosophers

Clarendon Press **The ideas of the German philosopher and mathematician Gottlob Frege lie at the root of the analytic movement in philosophy; Michael Dummett is his leading modern critical interpreter and one of today's most eminent philosophers. This volume collects together fifteen of Dummett's classic essays on Frege and related subjects.**

Everywhere and Everywhen

Adventures in Physics and Philosophy

Oxford University Press **This book, written for the general reader, explores the fundamental issues concerning the nature of time and space, and quantum mechanics. It shows how physics and philosophy work together to answer some of the deepest questions ever asked about the world.**

A Budget of Paradoxes

Cosimo, Inc. **A Budget of Paradoxes, originally published in 1915, is mathematician Augustus De Morgan's most accessible and entertaining work. Well-known for his wit, De Morgan takes aim at those people he calls "paradoxers," which in modern terms would most closely resemble crackpots. Paradoxers, however, are not crazy, necessarily-rather, they hold views wildly outside the accepted sphere. If you believed the world was round when everyone else knew that it was flat, you would be a paradoxer. In this book, De Morgan reviews a number of books from his own library written by such "crackpots" who claim to have solved a great many of the puzzles of mathematics and science, including squaring a circle, creating perpetual motion, and overcoming gravity. Each is thoroughly put in his place in ways both entertaining and informative to readers. Skeptics, students of science, and anyone who likes pondering a puzzle will find this book a delightful read. British mathematician AUGUSTUS DE MORGAN (1806-1871) invented the term mathematical induction. Among his many published works is Trigonometry and Double Algebra (1849).**

The Motion Paradox

The 2,500-Year Old Puzzle Behind All the Mysteries of Time and Space

Penguin **The epic tale of an ancient, unsolved puzzle and how it relates to all scientific attempts to explain the basic structure of the universe At the dawn of science the ancient Greek philosopher Zeno formulated his paradox of motion, and amazingly, it is still on the cutting edge of all investigations into the fabric of reality. Zeno used logic to argue that motion is impossible, and at the heart of his maddening puzzle is the nature of space and time. Is space-time continuous or broken up like a string of beads? Over the past two millennia, many of our greatest minds—including Aristotle, Galileo, Newton, Einstein, Stephen Hawking, and other current theoreticians—have been gripped by the mystery this puzzle represents. Joseph Mazur, acclaimed author of Euclid in the Rainforest, shows how historic breakthroughs in our understanding of motion shed light on Zeno's paradox. The orbits of the planets were explained, the laws of motion were revealed, the theory of relativity was discovered—but the basic structure of time and space remained elusive. In the tradition of Fermat's Enigma and Zero, The Motion Paradox is a lively history of this apparently simple puzzle whose solution—if indeed it can be solved—will reveal nothing less than the fundamental nature of reality.**

Paradox

The Nine Greatest Enigmas in Physics

Random House **Jim Al-Khalili is about to untangle the world's greatest science conundrums... _____ How does the fact that it gets dark at night prove the Universe must have started with a big bang? Where are all the aliens? Why does the length of a piece of string vary depending on how fast it is moving? Our subject is 'perceived paradoxes' - questions or thought-experiments that on first encounter seem impossible to answer, but which science has been able to solve. Our tour of these mind-expanding puzzles will take us through some of the greatest hits of science - from Einstein's theories about space and time, to the latest ideas of how the quantum world works. Some of our paradoxes may be familiar, such as Schrödinger's famous cat, which is seemingly alive and dead at the same time; or the Grandfather Paradox - if you travelled back in time and killed your grandfather you would not have been born and would not therefore have killed your grandfather. Other paradoxes will be new to you, but no less bizarre and fascinating. In resolving our paradoxes we will have to travel to the furthest reaches of the Universe and explore the very essence of space and time. Hold on tight.**

What the Tortoise Said to Achilles

Lindhardt og Ringhof **When a tortoise challenges a great Greek hero to use his logic in order to decipher a simple philosophical argument, slight chaos ensues. 'What the Tortoise Said to Achilles' is an endless cycle of suppositions and deductions. A refined piece of philosophical writing, Caroll's discussion was one of the first steps towards paradoxically explaining logical truth. His clever prose makes this novel an essential read for budding philosophers and logic aficionados. Lewis Caroll (1832-1898) was a British author. He was famed for his novel 'Alice in Wonderland' and its sequel 'Through the Looking-Glass'. Both of which have been successfully adapted to film and stage. Aside from this, he was also a mathematician, professional photographer, and clergyman. His colorful plotlines, powerful imagery, and endless imagination earned him the title of one of the most notable authors of the nineteenth century. Among his other notable works are the poetic collection "Phantasmagoria and Other Poems", the poem "The Hunting of the Snark", and the fairy novel "Sylvie and Bruno".**

Sleight of Mind

75 Ingenious Paradoxes in Mathematics, Physics, and Philosophy

MIT Press **Exploring more than seventy-five well-known paradoxes in mathematics, philosophy, physics, and the social sciences showing how reason and logic can dispel the illusion of contradiction. Paradox is a sophisticated kind of magic trick. A magician's purpose is to create the appearance of impossibility, to pull a rabbit from an empty hat. Yet paradox doesn't require tangibles, like rabbits or hats. Paradox works in the abstract, with words and concepts and symbols, to create the illusion of contradiction. There are no contradictions in reality, but there can appear to be. In Sleight of Mind, Matt Cook and a few collaborators dive deeply into more than 75 paradoxes in mathematics, physics, philosophy, and the social sciences. As each paradox is discussed and resolved, Cook helps readers discover the meaning of knowledge and the proper formation of concepts--and how reason can dispel the illusion of contradiction.**

A Mathematical Miscellany in Four Parts

I. An Essay Towards the Probable Solution of the Forty-five Surprizing Paradoxes in Gordon's Geography. II. Fifty-five New and Amazing Paradoxes, Some in Verse, Some in Prose, with Their Solutions. III. Answers to the Hundred Arithmetical Problems, Left Unanswered in Hill's Arithmetick, and Alexander's Algebra. IV. Miscellaneous Rules about Forming Aenigma's, Questions, the Doctrine of Eclipses, of Pendulums, the Equation of Time, Concerning Easter, &c

Inconsistent Mathematics

Springer Science & Business Media **without a properly developed inconsistent calculus based on infinitesimals, then in consistent claims from the history of the calculus might well simply be symptoms of confusion. This is addressed in Chapter 5. It is further argued that mathematics has a certain primacy over logic, in that paraconsistent or relevant logics have to be based on inconsistent mathematics. If the latter turns out to be reasonably rich then paraconsistentism is vindicated; while if inconsistent mathematics has seri ous restriytions then the case for being interested in inconsistency-tolerant logics is weakened. (On such restrictions, see this chapter, section 3.) It must be conceded that fault-tolerant computer programming (e. g. Chapter 8) finds a substantial and important use for paraconsistent logics, albeit with an epistemological motivation (see this chapter, section 3). But even here it should be noted that if inconsistent mathematics turned out to be functionally impoverished then so would inconsistent databases. 2. Summary In Chapter 2, Meyer's results on relevant arithmetic are set out, and his view that they have a bearing on G8del's incompleteness theorems is discussed. Model theory for nonclassical logics is also set out so as to be able to show that the inconsistency of inconsistent theories can be controlled or limited, but in this book model theory is kept in the background as much as possible. This is then used to study the functional properties of various equational number theories.**

Delta

A Paradox Logic

World Scientific **This book is about "delta", a paradox logic. In delta, a statement can be true yet false; it is an "imaginary" state, midway between being and non-being. Delta's imaginary value solves many logical dilemmas unsolvable in two-valued Boolean logic. Delta resolves these paradoxes -- Russell's, Cantor's, Betty's and Zeno's. Delta has two parts: inner delta logic, or "Kleenean logic", which resolves the classic paradoxes of mathematical logic; and outer delta logic, which relates delta to Z mod 3, conjugate logics, cyclic distribution, and the voter' paradox.**

Paradoxes in Probability Theory

Springer Science & Business Media **Paradoxes provide a vehicle for exposing misinterpretations and misapplications of accepted principles. This book discusses seven paradoxes surrounding probability theory. Some remain the focus of controversy; others have allegedly been solved, however the accepted solutions are demonstrably incorrect. Each paradox is shown to rest on one or more fallacies. Instead of the esoteric, idiosyncratic, and untested methods that have been brought to bear on these problems, the book invokes uncontroversial probability principles, acceptable both to frequentists and subjectivists. The philosophical disputation inspired by these paradoxes is shown to be misguided and unnecessary; for instance, startling claims concerning human destiny and the nature of reality are directly related to fallacious reasoning in a betting paradox, and a problem analyzed in philosophy journals is resolved by means of a computer program.**

A Mathematical Miscellany in Four Parts

I. An Essay Towards the Probable Solution of the Forty-five Surprizing Paradoxes in Gordon's Geography. II. Fifty-five New and Amazing Paradoxes, Some in Verse, Some in Prose, with Their Solutions. III. Answers to the Hundred Arithmetical Problems, Left Unanswered in Hill's Arithmetick, and Alexander's Algebra. IV. Miscellaneous Rules about Forming Aenigma's, Questions, the Doctrine of Eclipses, of Pendulums, the Equation of Time, Concerning Easter, &c

Diamond

A Paradox Logic

World Scientific **This book is about ''diamond'', a logic of paradox. In diamond, a statement can be true yet false; an ''imaginary'' state, midway between being and non-being. Diamond''s imaginary values solve many logical paradoxes unsolvable in two-valued boolean logic. In this volume, paradoxes by Russell, Cantor, Berry and Zeno are all resolved. This book has three sections: Paradox Logic, which covers the classic paradoxes of mathematical logic, shows how they can be resolved in this new system; The Second Paradox, which relates diamond to Boolean logic and the Spencer-Brown modulator; and Metamathematical Dilemma, which relates diamond to Godelian meta-mathematics and dilemma games.**

Universal Book of Mathematics

Chartwell Books **This A to Z resource provides endless exploration into the world of numbers.**