

Download Free Is God A Mathematician Mario Livio Read Pdf Free

Is God a Mathematician? Is God a Mathematician? Is God a Mathematician? **The Equation that Couldn't Be Solved** **Galileo Brilliant Blunders** **The Golden Ratio** *Why?* Rusalka **Mathematical Theory of Incompressible Nonviscous Fluids** **Power-Up Applied Probability and Statistics** Basic Probability Theory with Applications Theory of Stability of Continuous Elastic Structures **Understanding Drug Release and Absorption Mechanisms** **Introduction to Inverse Problems in Imaging** **Complex Analysis** **The Legacy of Mario Pieri in Geometry and Arithmetic** **The Legacy of Mario Pieri in Geometry and Arithmetic** *Mathematics in Architecture* **Math through the Ages: A Gentle History for Teachers and Others** **Expanded Second Edition** Piecewise-smooth Dynamical Systems *The Physical and Mathematical Foundations of the Theory of Relativity* **The Language God Talks** *The Legacy of Mario Pieri on the Foundations and Philosophy of Mathematics* **Why?** Truth, Existence and Explanation **The Legacy of Mario Pieri on the Foundations and Philosophy of Mathematics** **Math Games for Middle School** Mathematical Models in Biology **Applied Stochastic Processes** **Generalized Ricci Flow** Inverse Imaging with Poisson Data **Pizza Pizzazz!** **Introduction to Discrete Dynamical Systems and Chaos** How Mathematicians Think **Distance** **Expanding Random Mappings, Thermodynamical Formalism, Gibbs Measures and Fractal Geometry** The Mathematical Theory of Dilute Gases *Mathematicians and Their Gods* Math and You

A timely, accessible introduction to the mathematics of chaos. The past three decades have seen dramatic developments in the theory of dynamical systems, particularly regarding the exploration of chaotic behavior. Complex patterns of even simple processes arising in biology, chemistry, physics, engineering, economics, and a host of other disciplines have been investigated, explained, and utilized. *Introduction to Discrete Dynamical Systems and Chaos* makes these exciting and important ideas accessible to students and scientists by assuming, as a background, only the standard undergraduate training in calculus and linear algebra. Chaos is introduced at the outset and is then incorporated as an integral part of the theory of discrete dynamical systems in one or more dimensions. Both phase space and parameter space analysis are developed with ample exercises, more than 100 figures, and important practical examples such as the dynamics of atmospheric changes and neural networks. An appendix provides readers with clear guidelines on how to use *Mathematica* to explore discrete dynamical systems numerically. Selected programs can also be downloaded from a Wiley ftp site (address in preface). Another appendix lists possible projects that can be assigned for classroom investigation. Based on the author's 1993 book, but boasting at least 60% new, revised, and updated material, the present *Introduction to Discrete Dynamical Systems and Chaos* is a unique and extremely useful resource for all scientists interested in this active and intensely studied field. An Instructor's Manual presenting detailed solutions to all the problems in the book is available upon request from the Wiley editorial department. *Mario the Pizza Man* uses outrageous toppings and his knowledge of fractions to make perfect pizzas that can be divided up. Includes related math activities. Demand for better reliability from drug delivery systems has caused designers and researchers to move away from trial-and-error approaches and toward model-based methods of product development. Developing such models requires cross-disciplinary physical, mathematical, and physiological knowledge. Combining these areas under a single cover, *Understanding Drug Release and Absorption Mechanisms* builds a firm understanding of all elements needed to conceive, build, and implement successful models of drug release. Written by experts with broad industrial and academic experience, this book discusses the underlying physical principles, shows how to build mathematical models based on these principles, and finally compares the resulting models with experimental results. The authors begin by introducing the basics of modeling, physiological details of gastrointestinal and dermal absorption pathways, rheology, mass transport and thermodynamics, dissolution and partitioning, as well as size effects on the dissolution of crystallites. From this baseline, the authors explore applications in drug release from various delivery systems, specifically

matrix systems, microemulsions, and permeability through membranes. Working systematically from theory to working models, *Understanding Drug Release and Absorption Mechanisms: A Physical and Mathematical Approach* demonstrates the steps involved in designing, building, and implementing realistic and reliable models of drug release without unrealistically simplifying the theoretical parameters. An “intriguing and accessible” (Publishers Weekly) interpretation of the life of Galileo Galilei, one of history’s greatest and most fascinating scientists, that sheds new light on his discoveries and how he was challenged by science deniers. “We really need this story now, because we’re living through the next chapter of science denial” (Bill McKibben). Galileo’s story may be more relevant today than ever before. At present, we face enormous crises—such as minimizing the dangers of climate change—because the science behind these threats is erroneously questioned or ignored. Galileo encountered this problem 400 years ago. His discoveries, based on careful observations and ingenious experiments, contradicted conventional wisdom and the teachings of the church at the time. Consequently, in a blatant assault on freedom of thought, his books were forbidden by church authorities. Astrophysicist and bestselling author Mario Livio draws on his own scientific expertise and uses his “gifts as a great storyteller” (The Washington Post) to provide a “refreshing perspective” (Booklist) into how Galileo reached his bold new conclusions about the cosmos and the laws of nature. A freethinker who followed the evidence wherever it led him, Galileo was one of the most significant figures behind the scientific revolution. He believed that every educated person should know science as well as literature, and insisted on reaching the widest audience possible, publishing his books in Italian rather than Latin. Galileo was put on trial with his life in the balance for refusing to renounce his scientific convictions. He remains a hero and inspiration to scientists and all of those who respect science—which, as Livio reminds us in this “admirably clear and concise” (The Times, London) book, remains threatened everyday. Mario Pieri on the Foundations of Philosophy and Mathematics introduces readers to Pieri’s career and his studies in foundations, from both historical and modern viewpoints, placing his life and research in context and tracing his influence on his contemporaries as well as more recent mathematicians. The text also includes translations and commentary on Pieri’s original analyses on projective geometry, transformational geometry. The main intended audience for this book is undergraduate students in pure and applied sciences, especially those in engineering. Chapters 2 to 4 cover the probability theory they generally need in their training. Although the treatment of the subject is surely sufficient for non-mathematicians, I intentionally avoided getting too much into detail. For instance, topics such as mixed type random variables and the Dirac delta function are only briefly mentioned. Courses on probability theory are often considered difficult. However, after having taught this subject for many years, I have come to the conclusion that one of the biggest problems that the students face when they try to learn probability theory, particularly nowadays, is their deficiencies in basic differential and integral calculus. Integration by parts, for example, is often already forgotten by the students when they take a course on probability. For this reason, I have decided to write a chapter reviewing the basic elements of differential calculus. Even though this chapter might not be covered in class, the students can refer to it when needed. In this chapter, an effort was made to give the readers a good idea of the use in probability theory of the concepts they should already know. Chapter 2 presents the main results of what is known as elementary probability, including Bayes’ rule and elements of combinatorial analysis. The generalized Ricci flow is a geometric evolution equation which has recently emerged from investigations into mathematical physics, Hitchin’s generalized geometry program, and complex geometry. This book gives an introduction to this new area, discusses recent developments, and formulates open questions and conjectures for future study. The text begins with an introduction to fundamental aspects of generalized Riemannian, complex, and Kähler geometry. This leads to an extension of the classical Einstein-Hilbert action, which yields natural extensions of Einstein and Calabi-Yau structures as ‘canonical metrics’ in generalized Riemannian and complex geometry. The book then introduces generalized Ricci flow as a tool for constructing such metrics and proves extensions of the fundamental Hamilton/Perelman regularity theory of Ricci flow. These results are refined in the setting of generalized complex geometry, where the generalized Ricci flow is shown to preserve various integrability conditions, taking the form of pluriclosed flow and generalized Kähler-Ricci flow, leading to global convergence results and applications to complex geometry. Finally, the book gives a purely mathematical introduction to the physical idea of T-duality and discusses its relationship to generalized Ricci flow. The book is suitable for graduate students and researchers with a background in Riemannian and complex geometry who are interested in the theory of geometric evolution equations. Uses explanations, word problems, and games to

cover some mathematical topics that middle school students need to know, including the invention of numerical notations, basic arithmetical operations, measurements, geometry, graphs, and probability. This book serves as an aid to anyone seeking to perform and gain a deeper understanding of this multi-layered opera, which so trenchantly asks what it means to be human, to love, and to be loved in return. This book presents a coherent framework for understanding the dynamics of piecewise-smooth and hybrid systems. An informal introduction expounds the ubiquity of such models via numerous. The results are presented in an informal style, and illustrated with many examples. The book is aimed at a wide audience of applied mathematicians, engineers and scientists at the beginning postgraduate level. Almost no mathematical background is assumed other than basic calculus and algebra. This fascinating exploration of the great discoveries of history's most important mathematicians seeks an answer to the eternal question: Does mathematics hold the key to understanding the mysteries of the physical world? Illustrations throughout.

Inverse Imaging with Poisson Data is an invaluable resource for graduate students, postdocs and researchers interested in the application of inverse problems to the domains of applied sciences, such as microscopy, medical imaging and astronomy. The purpose of the book is to provide a comprehensive account of the theoretical results, methods and algorithms related to the problem of image reconstruction from Poisson data within the framework of the maximum likelihood approach introduced by Shepp and Vardi. This book contains more than 15 essays that explore issues in truth, existence, and explanation. It features cutting-edge research in the philosophy of mathematics and logic. Renowned philosophers, mathematicians, and younger scholars provide an insightful contribution to the lively debate in this interdisciplinary field of inquiry. The essays look at realism vs. anti-realism as well as inflationary vs. deflationary theories of truth. The contributors also consider mathematical fictionalism, structuralism, the nature and role of axioms, constructive existence, and generality. In addition, coverage also looks at the explanatory role of mathematics and the philosophical relevance of mathematical explanation. The book will appeal to a broad mathematical and philosophical audience. It contains work from FilMat, the Italian Network for the Philosophy of Mathematics. These papers collected here were also presented at their second international conference, held at the University of Chieti-Pescara, May 2016. This book is the first in a series of three volumes that comprehensively examine Mario Pieri's life, mathematical work and influence. The book introduces readers to Pieri's career and his studies in foundations, from both historical and modern viewpoints. Included in this volume are the first English translations, along with analyses, of two of his most important axiomatizations — one in arithmetic and one in geometry. The book combines an engaging exposition, little-known historical notes, exhaustive references and an excellent index. And yet the book requires no specialized experience in mathematical logic or the foundations of geometry. "Drawing on the lives of five great scientists -- Charles Darwin, William Thomson (Lord Kelvin), Linus Pauling, Fred Hoyle and Albert Einstein -- scientist/author Mario Livio shows how even the greatest scientists made major mistakes and how science built on these errors to achieve breakthroughs, especially into the evolution of life and the universe"-- 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. This book presents an exciting collection of contributions based on the workshop "Bringing Maths to Life" held October 27-29, 2014 in Naples, Italy. The state-of-the art research in biology and the statistical and analytical challenges facing huge masses of data collection are treated in this Work. Specific topics explored in depth surround the sessions and special invited sessions of

the workshop and include genetic variability via differential expression, molecular dynamics and modeling, complex biological systems viewed from quantitative models, and microscopy images processing, to name several. In depth discussions of the mathematical analysis required to extract insights from complex bodies of biological datasets, to aid development in the field novel algorithms, methods and software tools for genetic variability, molecular dynamics, and complex biological systems are presented in this book. Researchers and graduate students in biology, life science, and mathematics/statistics will find the content useful as it addresses existing challenges in identifying the gaps between mathematical modeling and biological research. The shared solutions will aid and promote further collaboration between life sciences and mathematics.

'Math through the Ages' is a treasure, one of the best history of math books at its level ever written. Somehow, it manages to stay true to a surprisingly sophisticated story, while respecting the needs of its audience. Its overview of the subject captures most of what one needs to know, and the 30 sketches are small gems of exposition that stimulate further exploration. --Glen van Brummelen, Quest University, President (2012-14) of the Canadian Society for History and Philosophy of Mathematics

Where did math come from? Who thought up all those algebra symbols, and why? What is the story behind π ? ... negative numbers? ... the metric system? ... quadratic equations? ... sine and cosine? ... logs? The 30 independent historical sketches in Math through the Ages answer these questions and many others in an informal, easygoing style that is accessible to teachers, students, and anyone who is curious about the history of mathematical ideas. Each sketch includes Questions and Projects to help you learn more about its topic and to see how the main ideas fit into the bigger picture of history. The 30 short stories are preceded by a 58-page bird's-eye overview of the entire panorama of mathematical history, a whirlwind tour of the most important people, events, and trends that shaped the mathematics we know today. "What to Read Next" and reading suggestions after each sketch provide starting points for readers who want to learn more. This book is ideal for a broad spectrum of audiences, including students in history of mathematics courses at the late high school or early college level, pre-service and in-service teachers, and anyone who just wants to know a little more about the origins of mathematics.

"More years ago than I care to reckon up, I met Richard Feynman." So begins The Language God Talks, Herman Wouk's gem on navigating the divide between science and religion. In one rich, compact volume, Wouk draws on stories from his life as well as on key events from the 20th century to address the eternal questions of why we are here, what purpose faith serves, and how scientific fact fits into the picture. He relates wonderful conversations he's had with scientists such as Feynman, Murray Gell-Mann, Freeman Dyson, and Steven Weinberg, and brings to life such pivotal moments as the 1969 moon landing and the Challenger disaster. Brilliantly written, The Language God Talks is a scintillating and lively investigation and a worthy addition to the literature. To open a newspaper or turn on the television it would appear that science and religion are polar opposites - mutually exclusive bedfellows competing for hearts and minds. There is little indication of the rich interaction between religion and science throughout history, much of which continues today. From ancient to modern times, mathematicians have played a key role in this interaction. This is a book on the relationship between mathematics and religious beliefs. It aims to show that, throughout scientific history, mathematics has been used to make sense of the 'big' questions of life, and theism is rich in both culture and character. Chapters cover a fascinating range of topics including the Sect of the Pythagoreans, Newton's views on the Apocalypse, Charles Dodgson's Anglican faith and Godel's proof of the existence of God.-- What do Bach's compositions, Rubik's Cube, the way we choose our mates, and the physics of subatomic particles have in common? All are governed by the laws of symmetry, which elegantly unify scientific and artistic principles. Yet the mathematical language of symmetry-known as group theory-did not emerge from the study of symmetry at all, but from an equation that couldn't be solved. For thousands of years mathematicians solved progressively more difficult algebraic equations, until they encountered the quintic equation, which resisted solution for three centuries. Working independently, two great prodigies ultimately proved that the quintic cannot be solved by a simple formula. These geniuses, a Norwegian named Niels Henrik Abel and a romantic Frenchman named Évariste Galois, both died tragically young. Their incredible labor, however, produced the origins of group theory. The first extensive, popular account of the mathematics of symmetry and order, The Equation That Couldn't Be Solved is told not through abstract formulas but in a beautifully written and dramatic account of the lives and work of some of the greatest and most intriguing mathematicians in history. This book uses a distinctly applied framework to present the most important topics in stochastic processes, including Gaussian and Markovian processes, Markov Chains, Poisson processes, Brownian motion and

queueing theory. The book also examines in detail special diffusion processes, with implications for finance, various generalizations of Poisson processes, and renewal processes. It contains numerous examples and approximately 350 advanced problems that reinforce both concepts and applications. Entertaining mini-biographies of mathematicians give an enriching historical context. The book includes statistical tables and solutions to the even-numbered problems at the end. Explores the plausibility of mathematical answers to puzzles in the physical world, in an accessible exploration of the lives and thoughts of such figures as Archimedes, Galileo, and Newton. By the author of *The Golden Ratio*. 50,000 first printing. Astrophysicist and author Mario Livio investigates perhaps the most human of all our characteristics—curiosity—in this “lively, expert, and definitely not dumbed-down account” (Kirkus Reviews) as he explores our innate desire to know why. Experiments demonstrate that people are more distracted when they overhear a phone conversation—where they can know only one side of the dialogue—than when they overhear two people talking and know both sides. Why does half a conversation make us more curious than a whole conversation? “Have you ever wondered why we wonder why? Mario Livio has, and he takes you on a fascinating quest to understand the origin and mechanisms of our curiosity. I thoroughly recommend it.” (Adam Riess, Nobel Prize Winner in Physics, 2011). Curiosity is not only at the heart of mystery and suspense novels, it is also essential to other creative endeavors, from painting to sculpture to music. It is the principal driver of basic scientific research. Even so, there is still no definitive scientific consensus about why we humans are so curious, or about the mechanisms in our brain that are responsible for curiosity. In the ever-fascinating *Why?* Livio interviewed scientists in several fields to explore the nature of curiosity. He examined the lives of two of history’s most curious geniuses, Leonardo da Vinci and Richard Feynman. He also talked to people with boundless curiosity: a superstar rock guitarist who is also an astrophysicist; an astronaut with degrees in computer science, biology, literature, and medicine. What drives these people to be curious about so many subjects? An astrophysicist who has written about mathematics, biology, and now psychology and neuroscience, Livio has firsthand knowledge of his subject which he explores in a lucid, entertaining way that will captivate anyone who is curious about curiosity. Bestselling author and astrophysicist Mario Livio examines the lives and theories of history’s greatest mathematicians to ask how—if mathematics is an abstract construction of the human mind—it can so perfectly explain the physical world. Nobel Laureate Eugene Wigner once wondered about “the unreasonable effectiveness of mathematics” in the formulation of the laws of nature. *Is God a Mathematician?* investigates why mathematics is as powerful as it is. From ancient times to the present, scientists and philosophers have marveled at how such a seemingly abstract discipline could so perfectly explain the natural world. More than that—mathematics has often made predictions, for example, about subatomic particles or cosmic phenomena that were unknown at the time, but later were proven to be true. Is mathematics ultimately invented or discovered? If, as Einstein insisted, mathematics is “a product of human thought that is independent of experience,” how can it so accurately describe and even predict the world around us? Physicist and author Mario Livio brilliantly explores mathematical ideas from Pythagoras to the present day as he shows us how intriguing questions and ingenious answers have led to ever deeper insights into our world. This fascinating book will interest anyone curious about the human mind, the scientific world, and the relationship between them. *Theory of Stability of Continuous Elastic Structures* presents an applied mathematical treatment of the stability of civil engineering structures. The book's modern and rigorous approach makes it especially useful as a text in advanced engineering courses and an invaluable reference for engineers. The theory of random dynamical systems originated from stochastic differential equations. It is intended to provide a framework and techniques to describe and analyze the evolution of dynamical systems when the input and output data are known only approximately, according to some probability distribution. The development of this field, in both the theory and applications, has gone in many directions. In this manuscript we introduce measurable expanding random dynamical systems, develop the thermodynamical formalism and establish, in particular, the exponential decay of correlations and analyticity of the expected pressure although the spectral gap property does not hold. This theory is then used to investigate fractal properties of conformal random systems. We prove a Bowen’s formula and develop the multifractal formalism of the Gibbs states. Depending on the behavior of the Birkhoff sums of the pressure function we arrive at a natural classification of the systems into two classes: quasi-deterministic systems, which share many properties of deterministic ones; and essentially random systems, which are rather generic and never bi-Lipschitz equivalent to deterministic systems. We show that in the essentially random case the Hausdorff measure vanishes, which refutes a conjecture by

Bogenschutz and Ochs. Lastly, we present applications of our results to various specific conformal random systems and positively answer a question posed by Bruck and Buger concerning the Hausdorff dimension of quadratic random Julia sets. This unique textbook offers a mathematically rigorous presentation of the theory of relativity, emphasizing the need for a critical analysis of the foundations of general relativity in order to best study the theory and its implications. The transitions from classical mechanics to special relativity and then to general relativity are explored in detail as well, helping readers to gain a more profound and nuanced understanding of the theory as a whole. After reviewing the fundamentals of differential geometry and classical mechanics, the text introduces special relativity, first using the physical approach proposed by Einstein and then via Minkowski's mathematical model. The authors then address the relativistic thermodynamics of continua and electromagnetic fields in matter – topics which are normally covered only very briefly in other treatments – in the next two chapters. The text then turns to a discussion of general relativity by means of the authors' unique critical approach, underlining the difficulty of recognizing the physical meaning of some statements, such as the physical meaning of coordinates and the derivation of physical quantities from those of space-time. Chapters in this section cover the model of space-time proposed by Schwarzschild; black holes; the Friedman equations and the different cosmological models they describe; and the Fermi-Walker derivative. Well-suited for graduate students in physics and mathematics who have a strong foundation in real analysis, classical mechanics, and general physics, this textbook is appropriate for a variety of graduate-level courses that cover topics in relativity. Additionally, it will interest physicists and other researchers who wish to further study the subtleties of these theories and understand the contemporary scholarly discussions surrounding them. This is a graduate textbook on the principles of linear inverse problems, methods of their approximate solution, and practical application in imaging. The level of mathematical treatment is kept as low as possible to make the book suitable for a wide range of readers from different backgrounds in science and engineering. Mathematical prerequisites are first courses in analysis, geometry, linear algebra, probability theory, and Fourier analysis. The authors concentrate on presenting easily implementable and fast solution algorithms. With examples and exercises throughout, the book will provide the reader with the appropriate background for a clear understanding of the essence of inverse problems (ill-posedness and its cure) and, consequently, for an intelligent assessment of the rapidly growing literature on these problems. "Did you know that every time you pick up the controller to your PlayStation or Xbox, you are entering a game world steeped in mathematics? Power-Up reveals the hidden mathematics in many of today's most popular video games and explains why mathematical learning doesn't just happen in the classroom or from books--you're doing it without even realizing it when you play games on your cell phone. In this lively and entertaining book, Matthew Lane discusses how gamers are engaging with the traveling salesman problem when they play Assassin's Creed, why it is mathematically impossible for Mario to jump through the Mushroom Kingdom in Super Mario Bros., and how The Sims teaches us the mathematical costs of maintaining relationships. He looks at mathematical pursuit problems in classic games like Missile Command and Ms. Pac-Man, and how each time you play Tetris, you're grappling with one of the most famous unsolved problems in all of mathematics and computer science. Along the way, Lane discusses why Family Feud and Pictionary make for ho-hum video games, how realism in video games (or the lack of it) influences learning, what video games can teach us about the mathematics of voting, the mathematics of designing video games, and much more. Power-Up shows how the world of video games is an unexpectedly rich medium for learning about the beautiful mathematical ideas that touch all aspects of our lives--including our virtual ones."--Dust jacket. Mario Pieri on the Foundations of Philosophy and Mathematics introduces readers to Pieri's career and his studies in foundations, from both historical and modern viewpoints, placing his life and research in context and tracing his influence on his contemporaries as well as more recent mathematicians. The text also includes translations and commentary on Pieri's original analyses on projective geometry, transformational geometry. A selection of some important topics in complex analysis, intended as a sequel to the author's Classical complex analysis (see preceding entry). The five chapters are devoted to analytic continuation; conformal mappings, univalent functions, and nonconformal mappings; entire function; meromorphic fu Fluid dynamics is an ancient science incredibly alive today. Modern technology and new needs require a deeper knowledge of the behavior of real fluids, and new discoveries or steps forward pose, quite often, challenging and difficult new mathematical problems. In this framework, a special role is played by incompressible nonviscous (sometimes called perfect) flows. This is a mathematical model consisting essentially of an evolution equation (the Euler equation) for the velocity field of fluids.

Such an equation, which is nothing other than the Newton laws plus some additional structural hypotheses, was discovered by Euler in 1755, and although it is more than two centuries old, many fundamental questions concerning its solutions are still open. In particular, it is not known whether the solutions, for reasonably general initial conditions, develop singularities in a finite time, and very little is known about the long-term behavior of smooth solutions. These and other basic problems are still open, and this is one of the reasons why the mathematical theory of perfect flows is far from being completed. Incompressible flows have been attacked, by many distinguished mathematicians, with a large variety of mathematical techniques so that, today, this field constitutes a very rich and stimulating part of applied mathematics. The Italian mathematician Mario Pieri (1860-1913) played an integral part in the research groups of Corrado Segre and Giuseppe Peano, and thus had a significant, yet somewhat underappreciated impact on several branches of mathematics, particularly on the development of algebraic geometry and the foundations of mathematics in the years around the turn of the 20th century. This book is the first in a series of three volumes that are dedicated to countering that neglect and comprehensively examining Pieri's life, mathematical work and influence in such diverse fields as mathematical logic, algebraic geometry, number theory, inversive geometry, vector analysis, and differential geometry. The *Legacy of Mario Pieri in Geometry and Arithmetic* introduces readers to Pieri's career and his studies in foundations, from both historical and modern viewpoints, placing his life and research in context and tracing his influence on his contemporaries as well as more recent mathematicians. The text also provides a glimpse of the Italian academic world of Pieri's time, and its relationship with the developing international mathematics community. Included in this volume are the first English translations, along with analyses, of two of his most important axiomatizations—his postulates for arithmetic, which Peano judged superior to his own; and his foundation of elementary geometry on the basis of point and sphere, which Alfred Tarski used as a basis for his own system. Combining an engaging exposition, little-known historical information, exhaustive references and an excellent index, this text will be of interest to graduate students, researchers and historians with a general knowledge of logic and advanced mathematics, and it requires no specialized experience in mathematical logic or the foundations of geometry. This book moves systematically through the topic of applied probability from an introductory chapter to such topics as random variables and vectors, stochastic processes, estimation, testing and regression. The topics are well chosen and the presentation is enriched by many examples from real life. Each chapter concludes with many original, solved and unsolved problems and hundreds of multiple choice questions, enabling those unfamiliar with the topics to master them. Additionally appealing are historical notes on the mathematicians mentioned throughout, and a useful bibliography. A distinguishing character of the book is its thorough and succinct handling of the varied topics. Livio investigates curiosity through the lives of paragons of inquisitiveness as Leonardo da Vinci and Richard Feynman. He interviewed a range of exceptionally curious people from an astronaut with degrees in statistics, medicine, and literature to a rock guitarist with a PhD in astrophysics. Throughout history, thinkers from mathematicians to theologians have pondered the mysterious relationship between numbers and the nature of reality. In this fascinating book, Mario Livio tells the tale of a number at the heart of that mystery: phi, or 1.6180339887... This curious mathematical relationship, widely known as "The Golden Ratio," was discovered by Euclid more than two thousand years ago because of its crucial role in the construction of the pentagram, to which magical properties had been attributed. Since then it has shown a propensity to appear in the most astonishing variety of places, from mollusk shells, sunflower florets, and rose petals to the shape of the galaxy. Psychological studies have investigated whether the Golden Ratio is the most aesthetically pleasing proportion extant, and it has been asserted that the creators of the Pyramids and the Parthenon employed it. It is believed to feature in works of art from Leonardo da Vinci's *Mona Lisa* to Salvador Dali's *The Sacrament of the Last Supper*, and poets and composers have used it in their works. It has even been found to be connected to the behavior of the stock market! The Golden Ratio is a captivating journey through art and architecture, botany and biology, physics and mathematics. It tells the human story of numerous phixated individuals, including the followers of Pythagoras who believed that this proportion revealed the hand of God; astronomer Johannes Kepler, who saw phi as the greatest treasure of geometry; such Renaissance thinkers as mathematician Leonardo Fibonacci of Pisa; and such masters of the modern world as Goethe, Cezanne, Bartok, and physicist Roger Penrose. Wherever his quest for the meaning of phi takes him, Mario Livio reveals the world as a place where order, beauty, and eternal mystery will always coexist.