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Levels of Infinity Princeton University Press
From the reviews: "... The notes and problems at the end of each chapter are very helpful. [...] In the final analysis, the book is definitely worth owning. [...] It is an extremely well written – but unusual – book that I highly recommend for all physicists." The Physics Teacher
Nonlinear Dynamics in Complex Systems Princeton University Press

This gives comprehensive coverage of the essential differential equations students they are likely to encounter in solving engineering and mechanics problems across the field -- alongside a more advance volume on applications. This first volume covers a very broad range of theories related to solving differential equations, mathematical preliminaries, ODE (n-th order and system of 1st order ODE in matrix form), PDE (1st order, 2nd, and higher order including wave, diffusion, potential, biharmonic equations and more). Plus more advanced topics such as Green's function method, integral and integro-differential equations, asymptotic expansion and perturbation, calculus of variations, variational and related methods, finite difference and numerical methods. All readers who are concerned with and interested in engineering mechanics problems, climate change, and nanotechnology will find topics covered in these books providing valuable information and mathematics background for their multi-disciplinary research and education.

Euler's Pioneering Equation Springer Science & Business Media
Acclaimed biography of the pioneer of modern electrical theory featuring a new preface by author. "He was a man who often was incapable of conducting himself properly in the most elementary social interactions. His only continuing contacts with women were limited to his mother, nieces, and housekeepers. He was a man who knew the power of money and desired it, but refused to work for it, preferring to live off the sweat of his family and long-suffering friends, whom he often insulted even as they paid his bills."—Excerpt from the book This, then, was Oliver Heaviside, a pioneer of modern electrical theory. Born into a low social class of Victorian England, Heaviside made advances in mathematics by introducing the operational calculus; in physics, where he formulated the modern-day expressions of Maxwell's Laws of electromagnetism; and in electrical engineering, through his duplex equations. With a new preface by the author, this acclaimed biography will appeal to historians of technology and science, as well as to scientists and engineers who wish to learn more about this remarkable man.
Oliver Heaviside CRC Press

Original anthology features less-technical essays discussing logic, topology, abstract algebra, relativity theory, and the works of David Hilbert. Most have been long unavailable or previously unpublished in book form. 2012 edition.

Numerical Linear Algebra with Applications Pearson Education

Geometric Measure Theory: A Beginner's Guide provides information pertinent to the development of geometric measure theory. This book presents a few fundamental arguments and a superficial discussion of the regularity theory. Organized into 12 chapters, this book begins with an overview of the purpose and fundamental concepts of geometric measure theory. This text then provides the measure-theoretic foundation, including the definition of Hausdorff measure and covering theory. Other chapters consider the m-dimensional surfaces of geometric measure theory called rectifiable sets and introduce the two basic tools of the regularity theory of area-minimizing surfaces. This book discusses as well the fundamental theorem of geometric measure theory, which guarantees solutions to a wide class of variational problems in general dimensions. The final chapter deals with the basic methods of geometry and analysis in a generality that embraces manifold applications. This book is a valuable resource for graduate students,

mathematicians, and research workers.
The Logician and the Engineer CRC Press
A Modern Introduction to Differential Equations, Second Edition, provides an introduction to the basic concepts of differential equations. The book begins by introducing the basic concepts of differential equations, focusing on the analytical, graphical, and numerical aspects of first-order equations, including slope fields and phase lines. The discussions then cover methods of solving second-order homogeneous and nonhomogeneous linear equations with constant coefficients; systems of linear differential equations; the Laplace transform and its applications to the solution of differential equations and systems of differential equations; and systems of nonlinear equations. Each chapter concludes with a summary of the important concepts in the chapter. Figures and tables are provided within sections to help students visualize or summarize concepts. The book also includes examples and exercises drawn from biology, chemistry, and economics, as well as from traditional pure mathematics, physics, and engineering. This book is designed for undergraduate students majoring in mathematics, the natural sciences, and engineering. However, students in economics, business, and the social sciences with the necessary background will also find the text useful. Student friendly readability- assessible to the average student Early introduction of qualitative and numerical methods Large number of exercises taken from biology, chemistry, economics, physics and engineering Exercises are labeled depending on difficulty/sophistication End of chapter summaries Group projects
The Science of Radio Academic Press

This book explores the idea of time travel from the first account in English literature to the latest theories of physicists such as Kip Thorne and Igor Novikov. This very readable work covers a variety of topics including: the history of time travel in fiction; the fundamental scientific concepts of time, spacetime, and the fourth dimension; the speculations of Einstein, Richard Feynman, Kurt Goedel, and others; time travel paradoxes, and much more.

Great Moments in Mathematics: After 1650 Springer Science & Business Media
We all played tag when we were kids. What most of us don't realize is that this simple chase game is in fact an application of pursuit theory, and that the same principles of games like tag, dodgeball, and hide-and-seek are also at play in military strategy, high-seas chases by the Coast Guard, and even romantic pursuits. In Chases and Escapes, Paul Nahin gives us the first complete history of this fascinating area of mathematics, from its classical analytical beginnings to the present day. Drawing on game theory, geometry, linear algebra, target-tracking algorithms, and much more, Nahin also offers an array of challenging puzzles with their historical background and broader applications. Chases and Escapes includes solutions to all problems and provides computer programs that readers can use for their own cutting-edge analysis. Now with a gripping new preface on how the Enola Gay escaped the shock wave from the atomic bomb dropped on Hiroshima, this book will appeal to anyone interested in the mathematics that underlie pursuit and evasion. Some images inside the book are unavailable due to digital copyright restrictions.

A Most Elegant Equation JHU Press
What does quilting have to do with electric circuit theory? The answer is just one of the fascinating ways that best-selling popular math writer Paul Nahin illustrates the deep interplay of math and physics in the world around us in his latest book of challenging mathematical puzzles, Mrs. Perkins's Electric Quilt. With his trademark combination of intriguing mathematical problems and the historical anecdotes surrounding them, Nahin invites readers on an exciting and informative exploration of some of the many ways math and physics combine to create something vastly more powerful, useful, and interesting than either is by itself. In a series of brief and largely self-contained chapters, Nahin discusses a wide range of topics in which math and physics are mutually dependent and mutually illuminating, from Newtonian gravity and Newton's laws of mechanics to ballistics, air drag, and electricity. The mathematical subjects range from algebra, trigonometry, geometry, and calculus to differential equations, Fourier series, and theoretical and Monte Carlo probability. Each chapter includes problems--some three dozen in all--that challenge readers to try their hand at applying what they have learned. Just as in his other books of mathematical puzzles, Nahin discusses the historical background of each problem, gives many examples, includes MATLAB codes, and provides complete and detailed solutions at the end. Mrs. Perkins's Electric Quilt will appeal to students interested in new math and physics applications, teachers looking for unusual examples to use in class--and anyone who enjoys popular math books.

Geometric Measure Theory Springer Science & Business Media
This book contains a broad overview of time travel in science fiction, along with a detailed examination of the philosophical implications of time travel. The emphasis of this book is now on the philosophical and on science fiction, rather than on physics, as in the author's earlier books on the subject. In that spirit there are, for example, no Tech Notes filled with algebra, integrals, and differential equations, as there are in the first and second editions of TIME MACHINES. Writing about time travel is, today, a respectable business. It hasn't always been so. After all, time travel, prima facie, appears to violate a fundamental law of nature; every effect has a cause, with the cause occurring before the effect. Time travel to the past, however, seems to allow, indeed to demand, backwards causation, with an effect (the time traveler emerging into the past as he exits from his time machine) occurring before its cause (the time traveler pushing the start button on his machine's control panel to start his trip backward through time). Time Machine Tales includes new discussions of the advances by physicists and philosophers that have appeared since the publication of TIME MACHINES in 1999, examples of which are the chapters on time travel paradoxes. Those chapters have been brought up-to-date with the latest philosophical thinking on the paradoxes.

Princeton University Press
With many areas of science reaching across their boundaries and becoming more and more interdisciplinary, students and researchers in these fields are confronted with techniques and tools not covered by their particular education. Especially in the life- and neurosciences quantitative models based on nonlinear dynamics and complex systems are becoming as frequently

implemented as traditional statistical analysis. Unfamiliarity with the terminology and rigorous mathematics may discourage many scientists to adopt these methods for their own work, even though such reluctance in most cases is not justified. This book bridges this gap by introducing the procedures and methods used for analyzing nonlinear dynamical systems. In Part I, the concepts of fixed points, phase space, stability and transitions, among others, are discussed in great detail and implemented on the basis of example elementary systems. Part II is devoted to specific, non-trivial applications: coordination of human limb movement (Haken-Kelso-Bunz model), self-organization and pattern formation in complex systems (Synergetics), and models of dynamical properties of neurons (Hodgkin-Huxley, Fitzhugh-Nagumo and Hindmarsh-Rose). Part III may serve as a refresher and companion of some mathematical basics that have been forgotten or were not covered in basic math courses. Finally, the appendix contains an explicit derivation and basic numerical methods together with some programming examples as well as solutions to the exercises provided at the end of certain chapters. Throughout this book all derivations are as detailed and explicit as possible, and everybody with some knowledge of calculus should be able to extract meaningful guidance follow and apply the methods of nonlinear dynamics to their own work. “This book is a masterful treatment, one might even say a gift, to the interdisciplinary scientist of the future.” “With the authoritative voice of a genuine practitioner, Fuchs is a master teacher of how to handle complex dynamical systems.” “What I find beautiful in this book is its clarity, the clear definition of terms, every step explained simply and systematically.” (J.A.Scott Kelso, excerpts from the foreword)

Pocket Book of Integrals and Mathematical Formulas Princeton University Press
More stimulating mathematics puzzles from bestselling author Paul Nahin How do technicians repair broken communications cables at the bottom of the ocean without actually seeing them? What's the likelihood of plucking a needle out of a haystack the size of the Earth? And is it possible to use computers to create a universal library of everything ever written or every photo ever taken? These are just some of the intriguing questions that best-selling popular math writer Paul Nahin tackles in Number-Crunching. Through brilliant math ideas and entertaining stories, Nahin demonstrates how odd and unusual math problems can be solved by bringing together basic physics ideas and today's powerful computers. Some of the outcomes discussed are so counterintuitive they will leave readers astonished. Nahin looks at how the art of number-crunching has changed since the advent of computers, and how high-speed technology helps to solve fascinating conundrums such as the three-body, Monte Carlo, leapfrog, and gambler's ruin problems. Along the way, Nahin traverses topics that include algebra, trigonometry, geometry, calculus, number theory, differential equations, Fourier series, electronics, and computers in science fiction. He gives historical background for the problems presented, offers many examples and numerous challenges, supplies MATLAB codes for all the theories discussed, and includes detailed and complete solutions. Exploring the intimate relationship between mathematics, physics, and the tremendous power of modern computers, Number-Crunching will appeal to anyone interested in understanding how these three important fields join forces to solve today's thorniest puzzles.

Masters of Theory University of Chicago Press
An engaging collection of intriguing problems that shows you how to think like a mathematical physicist Paul Nahin is a master at explaining odd phenomena through straightforward mathematics. In this collection of twenty-six intriguing problems,

he explores how mathematical physicists think. Always entertaining, the problems range from ancient catapult conundrums to the puzzling physics of a very peculiar material called NASTYGLASS—and from dodging trucks to why raindrops fall slower than the rate of gravity. The questions raised may seem impossible to answer at first and may require an unexpected twist in reasoning, but sometimes their solutions are surprisingly simple. Nahin's goal, however, is always to guide readers—who will need only to have studied advanced high school math and physics—in expanding their mathematical thinking to make sense of the curiosities of the physical world. The problems are in the first part of the book and the solutions are in the second, so that readers may challenge themselves to solve the questions on their own before looking at the explanations. The problems show how mathematics—including algebra, trigonometry, geometry, and calculus—can be united with physical laws to solve both real and theoretical problems. Historical anecdotes woven throughout the book bring alive the circumstances and people involved in some amazing discoveries and achievements. More than a puzzle book, this work will immerse you in the delights of scientific history while honing your math skills.

Explaining Beauty in Mathematics: An Aesthetic Theory of Mathematics Academic Press

Explores the mystery of planetary motion, based on the theories that came from famous scientists such as Newton, Archimedes, and Copernicus.

Number-Crunching Springer Nature
In the mid-eighteenth century, Swiss-born mathematician Leonhard Euler developed a formula so innovative and complex that it continues to inspire research, discussion, and even the occasional limerick. Dr. Euler's Fabulous Formula shares the fascinating story of this groundbreaking formula—long regarded as the gold standard for mathematical beauty—and shows why it still lies at the heart of complex number theory. In some ways a sequel to Nahin's An Imaginary Tale, this book examines the many applications of complex numbers alongside intriguing stories from the history of mathematics. Dr. Euler's Fabulous Formula is accessible to any reader familiar with calculus and differential equations, and promises to inspire mathematicians for years to come.

Chases and Escapes Springer Science & Business Media
What a splendid addition this is to the Dolciani Mathematical Exposition series! This second set of lectures on great moments in mathematics (after 1650) is a fascinating collection of pivotal points in the historical development of mathematics...The four lectures devoted to the liberation of geometry and algebra are of particular interest. The lectures should be required reading for all teachers of mathematics. —Herbert Fremont, The Mathematics Teacher
Eves is never less than tantalizing and usually inspiring...each 'great moment' has detailed exercises following it, as these have been carefully chosen to illustrate the depth of the ideas in question. —C. W. Kilmister, The London Times, Higher Education Supplement
As is usual with Eves' work, the books are well written and entertaining. They give an historical background to many of the best known mathematical results, and, in addition, provide interesting pieces of information about the mathematicians involved. Eves includes relevant exercises at the end of each chapter. These are a good source of different, interesting problems, and when combined with the material in the chapter, could form the basis for a mathematical project...Eves' book provides an interesting, well-written, and enjoyable account. You won't be disappointed. —David Parrott, The Australian Mathematics Teacher

An Equation for Every Occasion Princeton University Press

Dr. Euler's Fabulous FormulaPrinceton University Press
Gamma CRC Press
What are your chances of dying on your next flight, being called for jury duty, or winning the lottery? We all encounter probability problems in our everyday lives. In this collection of twenty-one puzzles, Paul Nahin challenges us to think creatively about the laws of probability as they apply in playful, sometimes deceptive, ways to a fascinating array of speculative situations. Games of Russian roulette, problems involving the accumulation of insects on flypaper, and strategies for determining the odds of the underdog winning the World Series all reveal intriguing dimensions to the workings of

probability. Over the years, Nahin, a veteran writer and teacher of the subject, has collected these and other favorite puzzles designed to instruct and entertain math enthusiasts of all backgrounds. If idiots A and B alternately take aim at each other with a six-shot revolver containing one bullet, what is the probability idiot A will win? What are the chances it will snow on your birthday in any given year? How can researchers use coin flipping and the laws of probability to obtain honest answers to embarrassing survey questions? The solutions are presented here in detail, and many contain a profound element of surprise. And some puzzles are beautiful illustrations of basic mathematical concepts: "The Blind Spider and the Fly," for example, is a clever variation of a "random walk" problem, and "Duelling Idiots" and "The Underdog and the World Series" are straightforward introductions to binomial distributions. Written in an informal way and containing a plethora of interesting historical material, Duelling Idiots is ideal for those who are fascinated by mathematics and the role it plays in everyday life and in our imaginations.

Mrs. Perkins's Electric Quilt Princeton University Press

In just seven symbols, with profound and beautiful simplicity, Euler's Equation connects five of the most important numbers in mathematics. Robin Wilson explores each number in turn, then brings them together to consider the power of the equation as a whole.

ICIAM 07 Princeton University Press
Numerical Linear Algebra with Applications is designed for those who want to gain a practical knowledge of modern computational techniques for the numerical solution of linear algebra problems, using MATLAB as the vehicle for computation. The book contains all the material necessary for a first year graduate or advanced undergraduate course on numerical linear algebra with numerous applications to engineering and science. With a unified presentation of computation, basic algorithm analysis, and numerical methods to compute solutions, this book is ideal for solving real-world problems. The text consists of six introductory chapters that thoroughly provide the required background for those who have not taken a course in applied or theoretical linear algebra. It explains in great detail the algorithms necessary for the accurate computation of the solution to the most frequently occurring problems in numerical linear algebra. In addition to examples from engineering and science applications, proofs of required results are provided without leaving out critical details. The Preface suggests ways in which the book can be used with or without an intensive study of proofs. This book will be a useful reference for graduate or advanced undergraduate students in engineering, science, and mathematics. It will also appeal to professionals in engineering and science, such as practicing engineers who want to see how numerical linear algebra problems can be solved using a programming language such as MATLAB, MAPLE, or Mathematica. Six introductory chapters that thoroughly provide the required background for those who have not taken a course in applied or theoretical linear algebra
Detailed explanations and examples
A through discussion of the algorithms necessary for the accurate computation of the solution to the most frequently occurring problems in numerical linear algebra
Examples from engineering and science applications