Mathematical Interest Theory Mathematical

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The Mathematical Theory of Communication - Claude Elwood Shannon 1962

Mathematical Finance - Christian Fries 2007-10-19
A balanced introduction to the theoretical foundations and real-world applications of mathematical finance The ever-growing use of derivative products makes it essential for financial industry practitioners to have a solid understanding of derivative pricing. To cope with the growing complexity, narrowing margins, and shortening life-cycle of the individual derivative product, an efficient, yet modular, implementation of the pricing algorithms is necessary. Mathematical Finance is the first book to harmonize the theory, modeling, and implementation of today's most prevalent pricing models under one convenient cover. Building a bridge from academia to practice, this self-contained text applies theoretical concepts to real-world examples and introduces state-of-the-art, object-oriented programming techniques that equip the reader with the conceptual and illustrative tools needed to understand and develop successful derivative pricing models. Utilizing almost twenty years of academic and industry experience, the author discusses the mathematical concepts that are the foundation of commonly used derivative pricing models, and insightful Motivation and Interpretation sections for each concept are presented to further illustrate the relationship between theory and practice. In-depth coverage of the common characteristics found amongst successful pricing models are provided in addition to key techniques and tips for the construction of these models. The opportunity to interactively explore the book's principal ideas and methodologies is made possible via a related Web site that features interactive Java experiments and exercises. While a high standard of mathematical precision is retained, Mathematical Finance emphasizes practical motivations, interpretations, and results and is an excellent textbook for students in mathematical finance, computational finance, and derivative pricing courses at the upper undergraduate or beginning graduate level. It also serves as a valuable reference for professionals in the banking, insurance, and asset management industries.
A Mathematical Introduction to Electronic Structure Theory - Lin Lin 2019-06-05
Based on first principle quantum mechanics, electronic structure theory is widely used in physics, chemistry, materials science, and related fields and has recently received increasing research attention in applied and computational mathematics. This book provides a self-contained, mathematically oriented introduction to the subject and its associated algorithms and analysis. It will help applied mathematics students and researchers with minimal background in physics understand the basics of electronic structure theory and prepare them to conduct research in this area. The book begins with an elementary introduction of quantum mechanics, including the uncertainty principle and the Hartree?Fock theory, which is considered the starting point of modern electronic structure theory. The authors then provide an in-depth discussion of two carefully selected topics that are directly related to several aspects of modern electronic structure

calculations: density matrix based algorithms and linear response theory. Chapter 2 introduces the Kohn?Sham density functional theory with a focus on the density matrix based numerical algorithms, and Chapter 3 introduces linear response theory, which provides a unified viewpoint of several important phenomena in physics and numerics. An understanding of these topics will prepare readers for more advanced topics in this field. The book concludes with the random phase approximation to the correlation energy. The book is written for advanced undergraduate and beginning graduate students, specifically those with mathematical backgrounds but without a priori knowledge of quantum mechanics, and can be used for self-study by researchers, instructors, and other scientists. The book can also serve as a starting point to learn about many-body perturbation theory, a topic at the frontier of the study of interacting electrons.

Introduction to Mathematical Systems Theory - J.C. Willems 2013-11-11

Using the behavioural approach to mathematical modelling, this book views a system as a dynamical relation between manifest and latent variables. The emphasis is on dynamical systems that are represented by systems of linear constant coefficients. The first part analyses the structure of the set of trajectories generated by such dynamical systems, and derives the conditions for two systems of differential equations to be equivalent in the sense that they define the same behaviour. In addition the memory structure of the system is analysed through state space models. The second part of the book is devoted to a number of important system properties, notably controllability, observability, and stability. In the third part, control problems are considered, in particular stabilisation and pole placement questions. Suitable for advanced undergraduate or beginning graduate students in mathematics and engineering, this text contains numerous exercises, including simulation problems, and examples, notably of mechanical systems and electrical circuits.

Group Theory in the Bedroom, and Other Mathematical Diversions - Brian Hayes 2008-04-01

An Award-Winning Essayist Plies His Craft Brian Hayes is one of the most accomplished essayists active today—a claim supported not only by his prolific and continuing high-quality output but also by such honors as the National Magazine Award for his commemorative Y2K essay titled "Clock of Ages," published in the November/December 1999 issue of The Sciences magazine. (The also-rans that year included Tom Wolfe, Verlyn Klinkenborg, and Oliver Sacks.) Hayes's work in this genre has also appeared in such anthologies as The Best American Magazine Writing, The Best American Science and Nature Writing, and The Norton Reader. Here he offers us a selection of his most memorable and accessible pieces—including "Clock of Ages"—embellishing them with an overall, scene-setting preface, reconfigured illustrations, and a refreshingly self-critical "Afterthoughts" section appended to each essay.

The Knot Book - Colin Conrad Adams 2004

Knots are familiar objects. Yet the mathematical theory of knots quickly leads to deep results in topology and geometry. This work offers an introduction to this theory, starting with our understanding of knots. It presents the applications of knot theory to modern chemistry, biology and physics.

Financial Mathematics For Actuarial Science - Richard James Wilders 2020-01-24

Financial Mathematics for Actuarial Science: The Theory of Interest is concerned with the measurement of interest and the various ways interest affects what is often called the time value of money (TVM). Interest is most simply defined as the compensation that a borrower pays to a lender for the use of capital. The goal of this book is to provide the mathematical understandings of interest and the time value of money needed to succeed on the actuarial examination covering interest theory Key Features Helps prepare students for the SOA Financial Mathematics Exam Provides mathematical understanding of interest and the time value of money needed to succeed in the actuarial examination covering interest theory Contains many worked examples, exercises and solutions for practice Provides training in the use of calculators for solving problems A complete solutions manual is available to faculty adopters online

Outlines and Highlights for Mathematical

Interest Theory by James W Daniel, Isbn - Cram101 Textbook Reviews 2010-12
Never HIGHLIGHT a Book Again! Virtually all of the testable terms, concepts, persons, places, and events from the textbook are included. Cram101 Just the FACTS101 studyguides give all of the outlines, highlights, notes, and quizzes for your textbook with optional online comprehensive practice tests. Only Cram101 is Textbook Specific. Accompanys: 9780131472853 .

Infinitesimal: How a Dangerous Mathematical Theory Shaped the Modern World - Amir Alexander 2014-04-08
This fascinating volume, taking readers from the blood religious strife of the 16th century to the battlefields of the English civil war, recounts the epic battle over a simple, yet "forbidden," mathematical concept that would eventually become the foundation of calculus. 30,000 first printing.

An introduction to transform theory - 1971-09-30
An introduction to transform theory

The Mathematical Theory of Finite Element Methods - Susanne Brenner 2013-03-14
A rigorous and thorough mathematical introduction to the subject; A clear and concise treatment of modern fast solution techniques such as multigrid and domain decomposition algorithms; Second edition contains two new chapters, as well as many new exercises; Previous edition sold over 3000 copies worldwide

Mathematical Foundations of Information Theory - Aleksandr I?Akovlevich Khinchin 1957-01-01
First comprehensive introduction to information theory explores the work of Shannon, McMillan, Feinstein, and Khinchin. Topics include the entropy concept in probability theory, fundamental theorems, and other subjects. 1957 edition.

Mathematical Theory of Dispersion-Managed Optical Solitons - Anjan Biswas 2010-07-07
"Mathematical Theory of Dispersion-Managed Optical Solitons" discusses recent advances covering optical solitons, soliton perturbation, optical cross-talk, Gabitov-Turitsyn Equations, quasi-linear pulses, and higher order Gabitov-Turitsyn Equations. Focusing on a mathematical perspective, the book bridges the gap between concepts in engineering and mathematics, and gives an outlook to many new topics for further research. The book is intended for researchers and graduate students in applied mathematics, physics and engineering and also it will be of interest to those who are conducting research in nonlinear fiber optics. Dr. Anjan Biswas is an Associate Professor at the Department of Applied Mathematics & Theoretical Physics, Delaware State University, Dover, DE, USA; Dr. Daniela Milovic is an Associate Professor at the Department of Telecommunications, Faculty of Electronic Engineering, University of Nis, Serbia; Dr. Matthew Edwards is the Dean of the School of Arts and Sciences at Alabama A & M University in Huntsville, AL, USA.

The Mathematical Theory of Coding - Ian F. Blake 2014-05-10
The Mathematical Theory of Coding focuses on the application of algebraic and combinatoric methods to the coding theory, including linear transformations, vector spaces, and combinatorics. The publication first offers information on finite fields and coding theory and combinatorial constructions and coding. Discussions focus on self-dual and quasicyclic codes, quadratic residues and codes, balanced incomplete block designs and codes, bounds on code dictionaries, code invariance under permutation groups, and linear transformations of vector spaces over finite fields. The text then takes a look at coding and combinatorics and the structure of semisimple rings. Topics include structure of cyclic codes and semisimple rings, group algebra and group characters, rings, ideals, and the minimum condition, chains and chain groups, dual chain groups, and matroids, graphs, and coding. The book ponders on group representations and group codes for the Gaussian channel, including distance properties of group codes, initial vector problem, modules, group algebras, andrepresentations, orthogonality relationships and properties of group characters, and representation of groups. The manuscript is a valuable source of data for mathematicians and researchers interested in the mathematical theory of coding.

A Mathematical Theory of Hints - Juerg Kohlas 2013-11-11
An approach to the modeling of and the

reasoning under uncertainty. The book develops the Dempster-Shafer Theory with regard to the reliability of reasoning with uncertain arguments. Of particular interest here is the development of a new synthesis and the integration of logic and probability theory. The reader benefits from a new approach to uncertainty modeling which extends classical probability theory.

Mathematical Interest Theory: Third Edition - Leslie Jane Federer Vaaler 2021-04-15

Mathematical Interest Theory provides an introduction to how investments grow over time. This is done in a mathematically precise manner. The emphasis is on practical applications that give the reader a concrete understanding of why the various relationships should be true. Among the modern financial topics introduced are: arbitrage, options, futures, and swaps. Mathematical Interest Theory is written for anyone who has a strong high-school algebra background and is interested in being an informed borrower or investor. The book is suitable for a mid-level or upper-level undergraduate course or a beginning graduate course. The content of the book, along with an understanding of probability, will provide a solid foundation for readers embarking on actuarial careers. The text has been suggested by the Society of Actuaries for people preparing for the Financial Mathematics exam. To that end, Mathematical Interest Theory includes more than 260 carefully worked examples. There are over 475 problems, and numerical answers are included in an appendix. A companion student solution manual has detailed solutions to the odd-numbered problems. Most of the examples involve computation, and detailed instruction is provided on how to use the Texas Instruments BA II Plus and BA II Plus Professional calculators to efficiently solve the problems. This Third Edition updates the previous edition to cover the material in the SOA study notes FM-24-17, FM-25-17, and FM-26-17.

Mathematical Theory of Entropy - Nathaniel F. G. Martin 2011-06-02

This excellent 1981 treatment of the mathematical theory of entropy gives an accessible exposition its application to other fields.

The Mathematical Theory of Communication - Claude E Shannon 1998-09-01

Scientific knowledge grows at a phenomenal pace--but few books have had as lasting an impact or played as important a role in our modern world as The Mathematical Theory of Communication, published originally as a paper on communication theory more than fifty years ago. Republished in book form shortly thereafter, it has since gone through four hardcover and sixteen paperback printings. It is a revolutionary work, astounding in its foresight and contemporaneity. The University of Illinois Press is pleased and honored to issue this commemorative reprinting of a classic.

Mathematical Control Theory - Eduardo D. Sontag 2013-11-21

Geared primarily to an audience consisting of mathematically advanced undergraduate or beginning graduate students, this text may additionally be used by engineering students interested in a rigorous, proof-oriented systems course that goes beyond the classical frequency-domain material and more applied courses. The minimal mathematical background required is a working knowledge of linear algebra and differential equations. The book covers what constitutes the common core of control theory and is unique in its emphasis on foundational aspects. While covering a wide range of topics written in a standard theorem/proof style, it also develops the necessary techniques from scratch. In this second edition, new chapters and sections have been added, dealing with time optimal control of linear systems, variational and numerical approaches to nonlinear control, nonlinear controllability via Lie-algebraic methods, and controllability of recurrent nets and of linear systems with bounded controls.

Stochastic Communities - A. K. Dewdney 2017-05-12

Stochastic Communities presents a theory of biodiversity by analyzing the distribution of abundances among species in the context of a community. The basis of this theory is a distribution called the "J distribution." This distribution is a pure hyperbola and mathematically implied by the "stochastic species hypothesis" assigning equal probabilities of birth and death within the population of each species over varying periods of time. The J

distribution in natural communities has strong empirical support resulting from a meta-study and strong theoretical support from a theorem that is mathematically implied by the stochastic species hypothesis.

A Treatise on the Theory of Functions - James Harkness 1893

Exercises in (Mathematical) Style - John McCleary 2017

What does style mean in mathematics? Style is both how one does something and how one communicates what was done. In this book, the author investigates the worlds of the well-known numbers, the binomial coefficients. The author follows the example of Raymond Queneau's Exercises in Style. Offering the reader 99 stories in various styles. The book celebrates the joy of mathematics and the joy of writing mathematics by exploring the rich properties of this familiar collection of numbers. For any one interested in mathematics, from high school students on up.

Alternative Mathematical Theory of Non-equilibrium Phenomena - Dieter Straub 1996-10-09

Alternative Mathematical Theory of Non-equilibrium Phenomena presents an entirely new theoretical approach to complex non-equilibrium phenomena, especially Gibbs/Falk thermodynamics and fluid mechanics. This innovative new theory allows for inclusion of all state variables and introduces a new vector-dissipation velocity-which leads to useful restatements of momentum, the Second Law, and tensors for the laws of motion, friction, and heat conduction. This application-oriented text is relatively self-contained and is an excellent guide-book for engineers with a strong interest in fundamentals, or for professionals using applied mathematics and physics in engineering applications. This book emphasizes macroscopic phenomena, focusing specifically on gaseous states, though relations to liquid and crystalline states are also considered. The author presents a new Alternative Continuum Theory of Compressible Fluids (AT) which providesa qualitative description of the subject in predominantly physical terms, minimizing the mathematical premises. The methodology discussed has applications in a wide range of fields outside of physics in areas including General System Theory, TheoreticalEconomics, and Biophysics and Medicine. Presents the first theory capable of handling non-equilibria phenomena Offers a unified theory of all branches of macroscopic physics Considers a consistent and uniform view of reality, supported by modern mathematics, leading to results different than those produced by classical theories Results in a change of paradigms in physics, engineering, and natural philosophy

Sedimentation and Thickening - E.M. Tory 2013-03-09

The aim of this book is to present a rigorous phenomenological and mathematical formulation of sedimentation processes and to show how this theory can be applied to the design and control of continuous thickeners. The book is directed to stu dents and researchers in applied mathematics and engineering sciences, especially in metallurgical, chemical, mechanical and civil engineering, and to practicing en gineers in the process industries. Such a vast and diverse audience should read this book differently. For this reason we have organized the chapters in such a way that the book can be read in two ways. Engineers and engineering students will find a rigorous formulation of the mathematical model of sedimentation and the exact and approximate solutions for the most important problems encountered in the laboratory and in industry in Chapters 1 to 3, 7 and 8, and 10 to 12, which form a self-contained subject. They can skip Chapters 4 to 6 and 9, which are most important to applied mathematicians, without losing the main features of sedimentation processes. On the other hand, applied mathematicians will find special interest in Chapters 4 to 6 and 9 which show some known but many recent results in the field of conservation laws of quasilinear hyperbolic and degenerate parabolic equations of great interest today. These two approaches to the theory keep their own styles: the mathematical approach with theorems and proofs, and the phenomenological approach with its deductive technique.

Mathematical Interest Theory - Leslie Jane Federer Vaaler 2009-02-19

Mathematical Interest Theory gives an introduction to how investments grow over time in a mathematically precise manner. The

emphasis is on practical applications that give the reader a concrete understanding of why the various relationships should be true. Among the modern financial topics introduced are: arbitrage, options, futures, and swaps. The content of the book, along with an understanding of probability, will provide a solid foundation for readers embarking on actuarial careers.Mathematical Interest Theory includes more than 240 carefully worked examples. There are over 430 problems, and numerical answers are included in an appendix. A companion student solution manual has detailed solutions to the odd-numbered problems. Key Features • Detailed instruction on how to use the Texas Instruments BA II Plus and BA II Plus professional calculators. • Examples are worked out with the problem and solution delineated so that the reader can think about the problem before reading the solution presented in the text • Key formulas, facts and algorithms placed in boxes so that they stand out in the text, and new terms printed in boldface as they are introduced • Descriptive titles are given for the examples in the book,(i.e., “Finding a(t) from ?t” or “Finding a bond's yield rate”)to help students skimming the book quickly find relevant material.• Exercises feature applied financial questions, • Writing activities for each chapter introduce each homework set.

Mathematical Methods in Risk Theory - Hans Bühlmann 2007-06-15

From the reviews: "The huge literature in risk theory has been carefully selected and supplemented by personal contributions of the author, many of which appear here for the first time. The result is a systematic and very readable book, which takes into account the most recent developments of the field. It will be of great interest to the actuary as well as to the statistician . . ." -- Math. Reviews Vol. 43

Mathematical Foundations of Quantum Theory - A.R. Marlow 2012-12-02

Mathematical Foundations of Quantum Theory is a collection of papers presented at the 1977 conference on the Mathematical Foundations of Quantum Theory, held in New Orleans. The contributors present their topics from a wide variety of backgrounds and specialization, but all shared a common interest in answering quantum issues. Organized into 20 chapters, this book's opening chapters establish a sound mathematical basis for quantum theory and a mode of observation in the double slit experiment. This book then describes the Lorentz particle system and other mathematical structures with which fundamental quantum theory must deal, and then some unsolved problems in the quantum logic approach to the foundations of quantum mechanics are considered. Considerable chapters cover topics on manuals and logics for quantum mechanics. This book also examines the problems in quantum logic, and then presents examples of their interpretation and relevance to nonclassical logic and statistics. The accommodation of conventional Fermi-Dirac and Bose-Einstein statistics in quantum mechanics or quantum field theory is illustrated. The final chapters of the book present a system of axioms for nonrelativistic quantum mechanics, with particular emphasis on the role of density operators as states. Specific connections of this theory with other formulations of quantum theory are also considered. These chapters also deal with the determination of the state of an elementary quantum mechanical system by the associated position and momentum distribution. This book is of value to physicists, mathematicians, and researchers who are interested in quantum theory.

An Introduction to Mathematical Logic and Type Theory - Peter B. Andrews 2013-04-17

In case you are considering to adopt this book for courses with over 50 students, please contact ties.nijssen@springer.com for more information. This introduction to mathematical logic starts with propositional calculus and first-order logic. Topics covered include syntax, semantics, soundness, completeness, independence, normal forms, vertical paths through negation normal formulas, compactness, Smullyan's Unifying Principle, natural deduction, cut-elimination, semantic tableaux, Skolemization, Herbrand's Theorem, unification, duality, interpolation, and definability. The last three chapters of the book provide an introduction to type theory (higher-order logic). It is shown how various mathematical concepts can be formalized in this very expressive formal language. This expressive notation facilitates proofs of the classical incompleteness and undecidability theorems

which are very elegant and easy to understand. The discussion of semantics makes clear the important distinction between standard and nonstandard models which is so important in understanding puzzling phenomena such as the incompleteness theorems and Skolem's Paradox about countable models of set theory. Some of the numerous exercises require giving formal proofs. A computer program called ETPS which is available from the web facilitates doing and checking such exercises. Audience: This volume will be of interest to mathematicians, computer scientists, and philosophers in universities, as well as to computer scientists in industry who wish to use higher-order logic for hardware and software specification and verification.

The Mathematical Theory of Cosmic Strings - M.R. Anderson 2015-05-06

This book is a comprehensive survey of the current state of knowledge about the dynamics and gravitational properties of cosmic strings treated in the idealized classical approximation as line singularities described by the Nambu-Goto action. The author's purpose is to provide a standard reference to all work that has been published since the mid-1970s and to link this work together in a single conceptual framework and a single notational formalism. A working knowledge of basic general relativity is assumed. The book will be essential reading for researchers and postgraduate students in mathematics, theoretical physics, and astronomy interested in cosmic strings.

Financial Mathematics For Actuaries (Third Edition) - Wai-sum Chan 2021-09-14

This book provides a thorough understanding of the fundamental concepts of financial mathematics essential for the evaluation of any financial product and instrument. Mastering concepts of present and future values of streams of cash flows under different interest rate environments is core for actuaries and financial economists. This book covers the body of knowledge required by the Society of Actuaries (SOA) for its Financial Mathematics (FM) Exam.The third edition includes major changes such as an addition of an 'R Laboratory' section in each chapter, except for Chapter 9. These sections provide R codes to do various computations, which will facilitate students to apply conceptual knowledge. Additionally, key definitions have been revised and the theme structure has been altered. Students studying undergraduate courses on financial mathematics for actuaries will find this book useful. This book offers numerous examples and exercises, some of which are adapted from previous SOA FM Exams. It is also useful for students preparing for the actuarial professional exams through self-study.

Mathematical Methods of Game and Economic Theory - Jean-Pierre Aubin 2007-01-01

Mathematical economics and game theory approached with the fundamental mathematical toolbox of nonlinear functional analysis are the central themes of this text. Both optimization and equilibrium theories are covered in full detail. The book's central application is the fundamental economic problem of allocating scarce resources among competing agents, which leads to considerations of the interrelated applications in game theory and the theory of optimization. Mathematicians, mathematical economists, and operations research specialists will find that it provides a solid foundation in nonlinear functional analysis. This text begins by developing linear and convex analysis in the context of optimization theory. The treatment includes results on the existence and stability of solutions to optimization problems as well as an introduction to duality theory. The second part explores a number of topics in game theory and mathematical economics, including two-person games, which provide the framework to study theorems of nonlinear analysis. The text concludes with an introduction to non-linear analysis and optimal control theory, including an array of fixed point and subjectivity theorems that offer powerful tools in proving existence theorems.

The Theory of Interest - Stephen G. Kellison 1991

1. The Measurement of Interest ; 2. Solution of Problems in Interest ; 3. Elementary Annuities ; 4. More General Annuities ; 5. Yield Rates ; 6. Amortization Schedules and Sinking Funds ; 7. Bond and Other Securities ; 8. Practical Applications ; 9. More Advanced Financial Analysis ; 10. A Stochastic Approach to Interest ; APPENDIXES I. Table of compound interest functions ; II. Table numbering the days of the

year ; III. Basic mathematical review ; IV. Statistical background ; V. An introduction to finite differences ; VI. Iteration methods ; VII. Further analysis of varying annuities ; VIII. A general formula for amortization with step-rate amounts ofprinciple ; Bibliography ; Answers to the exercises ; Index.

Student Solution Manual for Mathematical Interest Theory - Leslie Jane Federer Vaaler 2020-05-05

This manual is written to accompany Mathematical Interest Theory, by Leslie Jane Federer Vaaler and James Daniel. It includes detailed solutions to the odd-numbered problems. There are solutions to 239 problems, and sometimes more than one way to reach the answer is presented. In keeping with the presentation of the text, calculator discussions for the Texas Instruments BA II Plus or BA II Plus Professional calculator is typeset in a different font from the rest of the text.

Excursions in Number Theory - Charles Stanley Ogilvy 1988-01-01

Challenging, accessible mathematical adventures involving prime numbers, number patterns, irrationals and iterations, calculating prodigies, and more. No special training is needed, just high school mathematics and an inquisitive mind. "A splendidly written, well selected and presented collection. I recommend the book unreservedly to all readers." — Martin Gardner.

Student Solution Manual for Mathematical Interest Theory - Leslie Jane Federer Vaaler 2020-05-07

This manual is written to accompany the third edition of Mathematical Interest Theory by Leslie Jane Federer Vaaler, Shinko Kojima Harper, and James W. Daniel. It contains solutions to all the odd-numbered problems in that text. Individuals preparing for the Society of Actuaries examination in Financial Mathematics should find that the detailed solutions contained herein are an invaluable aid in their study. As in the main text, it is presumed that the reader has a Texas Instrument BA II Plus or BA II Plus Professional calculator available and instruction in its efficient use to solve these problems is included.

The Theory of Interest - 2014

An Introduction to the Mathematical Theory of Inverse Problems - Andreas Kirsch 1996-09-26

Following Keller [119] we call two problems inverse to each other if the for mulation of each of them requires full or partial knowledge of the other. By this definition, it is obviously arbitrary which of the two problems we call the direct and which we call the inverse problem. But usually, one of the problems has been studied earlier and, perhaps, in more detail. This one is usually called the direct problem, whereas the other is the inverse problem. However, there is often another, more important difference between these two problems. Hadamard (see [91]) introduced the concept of a well-posed problem, originating from the philosophy that the mathematical model of a physical problem has to have the properties of uniqueness, existence, and stability of the solution. If one of the properties fails to hold, he called the problem ill-posed. It turns out that many interesting and important inverse in science lead to ill-posed problems, while the corresponding di problems rect problems are well-posed. Often, existence and uniqueness can be forced by enlarging or reducing the solution space (the space of "models"). For restoring stability, however, one has to change the topology of the spaces, which is in many cases impossible because of the presence of measurement errors. At first glance, it seems to be impossible to compute the solution of a problem numerically if the solution of the problem does not depend continuously on the data, i. e. , for the case of ill-posed problems.

Model Theory and the Philosophy of Mathematical Practice - John T. Baldwin 2018-01-25

Major shifts in the field of model theory in the twentieth century have seen the development of new tools, methods, and motivations for mathematicians and philosophers. In this book, John T. Baldwin places the revolution in its historical context from the ancient Greeks to the last century, argues for local rather than global foundations for mathematics, and provides philosophical viewpoints on the importance of modern model theory for both understanding and undertaking mathematical practice. The volume also addresses the impact of model theory on contemporary algebraic geometry,

number theory, combinatorics, and differential equations. This comprehensive and detailed book will interest logicians and mathematicians as well as those working on the history and philosophy of mathematics.

Mathematical Theory of Economic Dynamics and Equilibria - V.L. Makarov 2012-12-06

This book is devoted to the mathematical analysis of models of economic dynamics and equilibria. These models form an important part of mathemati cal economics. Models of economic dynamics describe the motion of an economy through time. The basic concept in the study of these models is that of a trajectory, i.e., a sequence of elements of the phase space that describe admissible (possible) development of the economy. From all trajectories, we select those that are" desirable," i.e., optimal in terms of a certain criterion. The apparatus of point-set maps is the appropriate tool for the analysis of these models. The topological aspects of these maps (particularly, the Kakutani fixed-point theorem) are used to study equilibrium models as well as n-person games. To study dynamic models we use a special class of maps which, in this book, are called superlinear maps. The theory of superlinear point-set maps is, obviously, of interest in its own right. This theory is described in the first chapter. Chapters 2-4 are devoted to models of economic dynamics and present a detailed study of the properties of optimal trajectories. These properties are described in terms of theorems on characteristics (on the existence of dual prices) and turnpike theorems (theorems on asymptotic trajectories). In Chapter 5, we state and study a model of economic equilibrium. The basic idea is to establish a theorem about the existence of an equilibrium state for the Arrow-Debreu model and a certain generalization of it.

Mathematical Theory of Diffraction - Arnold Sommerfeld 2012-12-06

A. Sommerfeld's "Mathematische Theorie der Diffraction" marks a milestone in optical theory, full of insights that are still relevant today. In a stunning tour de force, Sommerfeld derives the first mathematically rigorous solution of an optical diffraction problem. Indeed, his diffraction analysis is a surprisingly rich and complex mix of pure and applied mathematics, and his often-cited diffraction solution is presented only as an application of a much more general set of mathematical results. This complete translation, reflecting substantial scholarship, is the first publication in English of Sommerfeld's original work. The extensive notes by the translators are rich in historical background and provide many technical details for the reader.