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KEY=MATHEMATICAL - MARLEY JASE

Mathematics for Machine Learning

Cambridge University Press Distills key concepts from linear algebra, geometry, matrices, calculus, optimization, probability and statistics that are used in machine learning.

Mathematical Foundations of Computer Networking

Addison-Wesley "To design future networks that are worthy of society's trust, we must put the 'discipline' of computer networking on a much stronger foundation. This book rises above the considerable minutiae of today's networking technologies to emphasize the long-standing mathematical underpinnings of the field." -Professor Jennifer Rexford, Department of Computer Science, Princeton University "This book is exactly the one I have been waiting for the last couple of years. Recently, I decided most students were already very familiar with the way the net works but were not being taught the fundamentals-the math. This book contains the knowledge for people who will create and understand future communications systems." -Professor Jon Crowcroft, The Computer Laboratory, University of Cambridge The Essential Mathematical Principles Required to Design, Implement, or Evaluate Advanced Computer Networks Students, researchers, and professionals in computer networking require a firm conceptual understanding of its foundations. **Mathematical Foundations of Computer Networking** provides an intuitive yet rigorous

introduction to these essential mathematical principles and techniques. Assuming a basic grasp of calculus, this book offers sufficient detail to serve as the only reference many readers will need. Each concept is described in four ways: intuitively; using appropriate mathematical notation; with a numerical example carefully chosen for its relevance to networking; and with a numerical exercise for the reader. The first part of the text presents basic concepts, and the second part introduces four theories in a progression that has been designed to gradually deepen readers' understanding. Within each part, chapters are as self-contained as possible. The first part covers probability; statistics; linear algebra; optimization; and signals, systems, and transforms. Topics range from Bayesian networks to hypothesis testing, and eigenvalue computation to Fourier transforms. These preliminary chapters establish a basis for the four theories covered in the second part of the book: queueing theory, game theory, control theory, and information theory. The second part also demonstrates how mathematical concepts can be applied to issues such as contention for limited resources, and the optimization of network responsiveness, stability, and throughput.

An Introduction to Numerical Methods and Analysis

John Wiley & Sons The new edition of the popular introductory textbook on numerical approximation methods and mathematical analysis, with a unique emphasis on real-world application **An Introduction to Numerical Methods and Analysis** helps students gain a solid understanding of a wide range of numerical approximation methods for solving problems of mathematical analysis. Designed for entry-level courses on the subject, this popular textbook maximizes teaching flexibility by first covering basic topics before gradually moving to more advanced material in each chapter and section. Throughout the text, students are provided clear and accessible guidance on a wide range of numerical methods and analysis techniques, including root-finding, numerical integration, interpolation, solution of systems of equations, and many others. This fully revised third edition contains new sections on higher-order difference methods, the bisection and inertia method for computing eigenvalues of a symmetric matrix, a completely re-written section on different methods for Poisson equations, and spectral methods for higher-dimensional problems. New problem sets—ranging in difficulty from simple computations to challenging derivations and proofs—are complemented by computer programming exercises, illustrative examples, and sample code. This acclaimed textbook: Explains how to both construct and evaluate approximations for accuracy and performance Covers both elementary concepts and tools and higher-level methods and solutions Features new and updated material reflecting new trends and applications in the field

Contains an introduction to key concepts, a calculus review, an updated primer on computer arithmetic, a brief history of scientific computing, a survey of computer languages and software, and a revised literature review. Includes an appendix of proofs of selected theorems and a companion website with additional exercises, application models, and supplemental resources. **An Introduction to Numerical Methods and Analysis, Third Edition** is the perfect textbook for upper-level undergraduate students in mathematics, science, and engineering courses, as well as for courses in the social sciences, medicine, and business with numerical methods and analysis components.

The American Mathematical Monthly

The Official Journal of the Mathematical Association of America

Quaternion Algebras

Springer Nature This open access textbook presents a comprehensive treatment of the arithmetic theory of quaternion algebras and orders, a subject with applications in diverse areas of mathematics. Written to be accessible and approachable to the graduate student reader, this text collects and synthesizes results from across the literature. Numerous pathways offer explorations in many different directions, while the unified treatment makes this book an essential reference for students and researchers alike. Divided into five parts, the book begins with a basic introduction to the noncommutative algebra underlying the theory of quaternion algebras over fields, including the relationship to quadratic forms. An in-depth exploration of the arithmetic of quaternion algebras and orders follows. The third part considers analytic aspects, starting with zeta functions and then passing to an idelic approach, offering a pathway from local to global that includes strong approximation. Applications of unit groups of quaternion orders to hyperbolic geometry and low-dimensional topology follow, relating geometric and topological properties to arithmetic invariants. Arithmetic geometry completes the volume, including quaternionic aspects of modular forms, supersingular elliptic curves, and the moduli of QM abelian surfaces. **Quaternion Algebras** encompasses a vast wealth of knowledge at the intersection of many

fields. Graduate students interested in algebra, geometry, and number theory will appreciate the many avenues and connections to be explored. Instructors will find numerous options for constructing introductory and advanced courses, while researchers will value the all-embracing treatment. Readers are assumed to have some familiarity with algebraic number theory and commutative algebra, as well as the fundamentals of linear algebra, topology, and complex analysis. More advanced topics call upon additional background, as noted, though essential concepts and motivation are recapped throughout.

Analysis I

Third Edition

Springer This is part one of a two-volume book on real analysis and is intended for senior undergraduate students of mathematics who have already been exposed to calculus. The emphasis is on rigour and foundations of analysis. Beginning with the construction of the number systems and set theory, the book discusses the basics of analysis (limits, series, continuity, differentiation, Riemann integration), through to power series, several variable calculus and Fourier analysis, and then finally the Lebesgue integral. These are almost entirely set in the concrete setting of the real line and Euclidean spaces, although there is some material on abstract metric and topological spaces. The book also has appendices on mathematical logic and the decimal system. The entire text (omitting some less central topics) can be taught in two quarters of 25-30 lectures each. The course material is deeply intertwined with the exercises, as it is intended that the student actively learn the material (and practice thinking and writing rigorously) by proving several of the key results in the theory.

The Mathematics Teacher

Numerical Solution of SDE Through Computer Experiments

Springer Science & Business Media This book provides an easily accessible, computationally-oriented introduction into the numerical solution of stochastic differential equations using computer experiments. It develops in the reader an ability to apply numerical methods solving stochastic differential equations. It also creates an intuitive understanding of the necessary theoretical background. Software containing programs for over 100 problems is available online.

Mathematical Reviews

The Computer Modelling of Mathematical Reasoning

This review of the work done to date on the computer modelling of mathematical reasoning processes brings together a variety of approaches and disciplines within a coherent frame. A limited knowledge of mathematics is assumed in the introduction to the principles of mathematical logic. The plan of the book is such that students with varied backgrounds can find necessary information as quickly as possible. Exercises are included throughout the book.

The Cauchy-Schwarz Master Class

An Introduction to the Art of Mathematical Inequalities

Cambridge University Press This 2004 book presents a fascinating collection of problems related to the Cauchy-Schwarz inequality and coaches readers through solutions.

Catalog of Copyright Entries. Third Series

1975: January-June: Index

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The Laplacian on a Riemannian Manifold

An Introduction to Analysis on

Manifolds

Cambridge University Press This text on analysis of Riemannian manifolds is aimed at students who have had a first course in differentiable manifolds.

An Introduction to Mathematical Epidemiology

Springer The book is a comprehensive, self-contained introduction to the mathematical modeling and analysis of infectious diseases. It includes model building, fitting to data, local and global analysis techniques. Various types of deterministic dynamical models are considered: ordinary differential equation models, delay-differential equation models, difference equation models, age-structured PDE models and diffusion models. It includes various techniques for the computation of the basic reproduction number as well as approaches to the epidemiological interpretation of the reproduction number. MATLAB code is included to facilitate the data fitting and the simulation with age-structured models.

Spectral Methods

Algorithms, Analysis and Applications

Springer Science & Business Media Along with finite differences and finite elements, spectral methods are one of the three main methodologies for solving partial differential equations on computers. This book provides a detailed presentation of basic spectral algorithms, as well as a systematic presentation of basic convergence theory and error analysis for spectral methods. Readers of this book will be exposed to a unified framework for designing and analyzing spectral algorithms for a variety of problems, including in particular high-order differential equations and problems in unbounded domains. The book contains a large number of figures which are designed to illustrate various concepts stressed in the book. A set of basic matlab codes has been made available online to help the readers to develop their own spectral codes for their specific applications.

Mathematics Magazine

Mathematics Today

Bulletin of the Institute of
Mathematics and Its Applications

Mathematical Analysis I

Springer Science & Business Media This work by Zorich on **Mathematical Analysis** constitutes a thorough first course in real analysis, leading from the most elementary facts about real numbers to such advanced topics as differential forms on manifolds, asymptotic methods, Fourier, Laplace, and Legendre transforms, and elliptic functions.

Business and Technology Sources

An Introduction to Harmonic
Analysis

American Scientific Books

A Course in Calculus and Real
Analysis

Springer Science & Business Media This book provides a self-contained and rigorous introduction to calculus of functions of one variable, in a presentation which emphasizes the structural development of calculus. Throughout, the authors highlight the fact that calculus provides a firm foundation to concepts and results that are generally encountered in high school and accepted on faith; for example, the classical result that the ratio of circumference to diameter is the same for all circles. A number of topics are treated here in considerable detail that may be inadequately covered in calculus courses and glossed over in real analysis courses.

Catalogue of the University of Dakota for the Year ..., with Announcements for the Year ...

Introduction to Partial Differential Equations

Springer Science & Business Media This textbook is designed for a one year course covering the fundamentals of partial differential equations, geared towards advanced undergraduates and beginning graduate students in mathematics, science, engineering, and elsewhere. The exposition carefully balances solution techniques, mathematical rigor, and significant applications, all illustrated by numerous examples. Extensive exercise sets appear at the end of almost every subsection, and include straightforward computational problems to develop and reinforce new techniques and results, details on theoretical developments and proofs, challenging projects both computational and conceptual, and supplementary material that motivates the student to delve further into the subject. No previous experience with the subject of partial differential equations or Fourier theory is assumed, the main prerequisites being undergraduate calculus, both one- and multi-variable, ordinary differential equations, and basic linear algebra. While the classical topics of separation of variables, Fourier analysis, boundary value problems, Green's functions, and special functions continue to form the core of an introductory course, the inclusion of nonlinear equations, shock wave dynamics, symmetry and similarity, the Maximum Principle, financial models, dispersion and solutions, Huygens' Principle, quantum mechanical systems, and more make this text well attuned to recent developments and trends in this active field of contemporary research. Numerical approximation schemes are an important component of any introductory course, and the text covers the two most basic approaches: finite differences and finite elements.

Mathematical Statistics and Data Analysis

Cengage Learning This is the first text in a generation to re-examine the purpose of the mathematical statistics course. The book's approach interweaves traditional topics with data analysis and reflects the use of the computer with close ties to the practice of statistics. The author stresses

analysis of data, examines real problems with real data, and motivates the theory. The book's descriptive statistics, graphical displays, and realistic applications stand in strong contrast to traditional texts that are set in abstract settings. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

The Book of R

A First Course in Programming and Statistics

No Starch Press The Book of R is a comprehensive, beginner-friendly guide to R, the world's most popular programming language for statistical analysis. Even if you have no programming experience and little more than a grounding in the basics of mathematics, you'll find everything you need to begin using R effectively for statistical analysis. You'll start with the basics, like how to handle data and write simple programs, before moving on to more advanced topics, like producing statistical summaries of your data and performing statistical tests and modeling. You'll even learn how to create impressive data visualizations with R's basic graphics tools and contributed packages, like ggplot2 and ggvis, as well as interactive 3D visualizations using the rgl package. Dozens of hands-on exercises (with downloadable solutions) take you from theory to practice, as you learn:

- The fundamentals of programming in R, including how to write data frames, create functions, and use variables, statements, and loops
- Statistical concepts like exploratory data analysis, probabilities, hypothesis tests, and regression modeling, and how to execute them in R
- How to access R's thousands of functions, libraries, and data sets
- How to draw valid and useful conclusions from your data
- How to create publication-quality graphics of your results

Combining detailed explanations with real-world examples and exercises, this book will provide you with a solid understanding of both statistics and the depth of R's functionality. Make The Book of R your doorway into the growing world of data analysis.

Catalog of Copyright Entries

New Scientist

Introduction to Functional Equations

Theory and Problem-solving Strategies for Mathematical Competitions and Beyond

American Mathematical Soc. Functions and their properties have been part of the rigorous precollege curriculum for decades. And functional equations have been a favorite topic of the leading national and international mathematical competitions. Yet the subject has not received equal attention by authors at an introductory level. The majority of the books on the topic remain unreachable to the curious and intelligent precollege student. The present book is an attempt to eliminate this disparity. The book opens with a review chapter on functions, which collects the relevant foundational information on functions, plus some material potentially new to the reader. The next chapter presents a working definition of functional equations and explains the difficulties in trying to systematize the theory. With each new chapter, the author presents methods for the solution of a particular group of equations. Each chapter is complemented with many solved examples, the majority of which are taken from mathematical competitions and professional journals. The book ends with a chapter of unsolved problems and some other auxiliary material. The book is an invaluable resource for precollege and college students who want to deepen their knowledge of functions and their properties, for teachers and instructors who wish to enrich their curricula, and for any lover of mathematical problem-solving techniques. In the interest of fostering a greater awareness and appreciation of mathematics and its connections to other disciplines and everyday life, MSRI and the AMS are publishing books in the Mathematical Circles Library series as a service to young people, their parents and teachers, and the mathematics profession.

Mathematical Epidemiology

Springer Science & Business Media Based on lecture notes of two summer schools with a mixed audience from mathematical sciences, epidemiology and public health, this volume offers a comprehensive introduction to basic ideas and techniques in modeling infectious diseases, for the comparison of strategies to plan for an anticipated epidemic or pandemic, and to deal with a disease outbreak in real time. It covers detailed case studies for

diseases including pandemic influenza, West Nile virus, and childhood diseases. Models for other diseases including Severe Acute Respiratory Syndrome, fox rabies, and sexually transmitted infections are included as applications. Its chapters are coherent and complementary independent units. In order to accustom students to look at the current literature and to experience different perspectives, no attempt has been made to achieve united writing style or unified notation. Notes on some mathematical background (calculus, matrix algebra, differential equations, and probability) have been prepared and may be downloaded at the web site of the Centre for Disease Modeling (www.cdm.yorku.ca).

Introduction to Shape Optimization

Shape Sensitivity Analysis

Springer Science & Business Media This book is motivated largely by a desire to solve shape optimization problems that arise in applications, particularly in structural mechanics and in the optimal control of distributed parameter systems. Many such problems can be formulated as the minimization of functionals defined over a class of admissible domains. Shape optimization is quite indispensable in the design and construction of industrial structures. For example, aircraft and spacecraft have to satisfy, at the same time, very strict criteria on mechanical performance while weighing as little as possible. The shape optimization problem for such a structure consists in finding a geometry of the structure which minimizes a given functional (e. g. such as the weight of the structure) and yet simultaneously satisfies specific constraints (like thickness, strain energy, or displacement bounds). The geometry of the structure can be considered as a given domain in the three-dimensional Euclidean space. The domain is an open, bounded set whose topology is given, e. g. it may be simply or doubly connected. The boundary is smooth or piecewise smooth, so boundary value problems that are defined in the domain and associated with the classical partial differential equations of mathematical physics are well posed. In general the cost functional takes the form of an integral over the domain or its boundary where the integrand depends smoothly on the solution of a boundary value problem.

American Scientist

The Athenaeum

An Introduction to Manifolds

Springer Science & Business Media Manifolds, the higher-dimensional analogs of smooth curves and surfaces, are fundamental objects in modern mathematics. Combining aspects of algebra, topology, and analysis, manifolds have also been applied to classical mechanics, general relativity, and quantum field theory. In this streamlined introduction to the subject, the theory of manifolds is presented with the aim of helping the reader achieve a rapid mastery of the essential topics. By the end of the book the reader should be able to compute, at least for simple spaces, one of the most basic topological invariants of a manifold, its de Rham cohomology. Along the way, the reader acquires the knowledge and skills necessary for further study of geometry and topology. The requisite point-set topology is included in an appendix of twenty pages; other appendices review facts from real analysis and linear algebra. Hints and solutions are provided to many of the exercises and problems. This work may be used as the text for a one-semester graduate or advanced undergraduate course, as well as by students engaged in self-study. Requiring only minimal undergraduate prerequisites, 'Introduction to Manifolds' is also an excellent foundation for Springer's GTM 82, 'Differential Forms in Algebraic Topology'.

Applied Mechanics Reviews

Ecology

A Basic Course in Real Analysis

CRC Press Based on the authors' combined 35 years of experience in teaching, A Basic Course in Real Analysis introduces students to the aspects of real analysis in a friendly way. The authors offer insights into the way a typical mathematician works observing patterns, conducting experiments by means of looking at or creating examples, trying to understand the underlying principles, and coming up with guesses or conjectures and then proving them rigorously based on his or her explorations. With more than 100 pictures, the book creates interest in real analysis by encouraging students to think geometrically. Each difficult proof is prefaced by a strategy and explanation of how the strategy is translated into rigorous and precise proofs. The authors then explain the mystery and role of inequalities in analysis to train students to arrive at estimates that will be useful for proofs. They highlight the role of the least upper bound property of real numbers, which underlies all crucial results in real analysis. In addition, the book demonstrates analysis as a qualitative as well as quantitative study of functions, exposing students to arguments that fall under hard analysis. Although there are many books available on

this subject, students often find it difficult to learn the essence of analysis on their own or after going through a course on real analysis. Written in a conversational tone, this book explains the hows and whys of real analysis and provides guidance that makes readers think at every stage.

The British National Bibliography

Midwest Engineer

A Manual of Topographical Drawing