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Category Theory in Context

Courier Dover Publications Introduction to concepts of category theory — categories, functors, natural transformations, the Yoneda lemma, limits and colimits, adjunctions, monads — revisits a broad range of mathematical examples from the categorical perspective. 2016 edition.

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.

Rays, Waves, and Scattering

Topics in Classical Mathematical Physics

Princeton University Press This one-of-a-kind book presents many of the mathematical concepts, structures, and techniques used in the study of rays, waves, and scattering. Panoramic in scope, it includes discussions of how ocean waves are refracted around islands and underwater ridges, how seismic waves are refracted in the earth's interior, how atmospheric waves are scattered by mountains and ridges, how the scattering of light waves produces the blue sky, and meteorological phenomena such as rainbows and coronas. Rays, Waves, and Scattering is a valuable resource for practitioners, graduate students, and advanced undergraduates in applied mathematics, theoretical physics, and engineering. Bridging the gap between advanced treatments of the subject written for specialists and less mathematical books aimed at beginners, this unique mathematical compendium features problems and exercises throughout that are geared to various levels of sophistication, covering everything from Ptolemy's theorem to Airy integrals (as well as more technical material), and several informative appendixes. Provides a panoramic look at wave motion in many different contexts Features problems and exercises throughout Includes numerous appendixes, some on topics not often covered An ideal reference book for practitioners Can also serve as a supplemental text in classical applied mathematics, particularly wave theory and mathematical methods in physics and engineering Accessible to anyone with a strong background in ordinary differential equations, partial differential equations, and functions of a complex variable

The Mathematics of Diffusion

Oxford University Press Though it incorporates much new material, this new edition preserves the general character of the book in providing a collection of solutions of the equations of diffusion and describing how these solutions may be obtained.

Calculus II For Dummies

John Wiley & Sons

Calculus for Business, Economics, and the Social and Life Sciences

Calculus for Business, Economics, and the Social and Life Sciences introduces calculus in real-world contexts and provides a sound, intuitive understanding of the basic concepts students need as they pursue careers in business, the life sciences, and the social sciences. The new Ninth Edition builds on the straightforward writing style, practical applications from a variety of disciplines, clear step-by-step problem solving techniques, and comprehensive exercise sets that have been hallmarks of Hoffmann/Bradley's success through the years.

Introduction to Representation Theory

American Mathematical Soc. Very roughly speaking, representation theory studies symmetry in linear spaces. It is a beautiful mathematical subject which has many applications, ranging from number theory and combinatorics to geometry, probability theory, quantum mechanics, and quantum field theory. The goal of this book is to give a "holistic" introduction to representation theory, presenting it as a unified subject which studies representations of associative algebras and treating the representation theories of groups, Lie algebras, and quivers as special cases. Using this approach, the book covers a number of standard topics in the representation theories of these structures. Theoretical material in the book is supplemented by many problems and exercises which touch upon a lot of additional topics; the more difficult exercises are provided with hints. The book is designed as a textbook for advanced undergraduate and beginning graduate students. It should be accessible to students with a strong background in linear algebra and a basic knowledge of abstract algebra.

Honors Calculus

Princeton University Press This is the first modern calculus book to be organized axiomatically and to survey the subject's applicability to science and engineering. A challenging exposition of calculus in the European style, it is an excellent text for a first-year university honors course or for a third-year analysis course. The calculus is built carefully from the axioms with all the standard results deduced from these axioms. The concise construction, by design, provides maximal flexibility for the instructor and allows the student to see the overall flow of the development. At the same time, the book reveals the origins of the calculus in celestial mechanics and number theory. The book introduces many topics often left to the appendixes in standard calculus textbooks and develops their connections with physics, engineering, and statistics. The author uses applications of derivatives and integrals to show how calculus is applied in these disciplines. Solutions to all exercises (even those involving proofs) are available to instructors upon request, making this book unique among texts in the field. Focuses on single variable calculus Provides a balance of precision and intuition Offers both routine and demanding exercises

Dynamical Systems and Applications

World Scientific World Scientific series in Applicable Analysis (WSSIAA) aims at reporting new developments of high mathematical standard and current interest. Each volume in the series shall be devoted to the mathematical analysis that has been applied or potentially applicable to the solutions of scientific, engineering, and social problems. For the past twenty five years, there has been an explosion of interest in the study of nonlinear dynamical systems. Mathematical techniques developed during this period have been applied to important nonlinear problems ranging from physics and chemistry to ecology and economics. All these developments have made dynamical systems theory an important and attractive branch of mathematics to scientists in many disciplines. This rich mathematical subject has been partially represented in this collection of 45 papers by some of the leading researchers in the area. This volume contains 45 state-of-art articles on the mathematical theory of dynamical systems by leading researchers. It is hoped that this collection will lead new direction in this field. Contributors: B Abraham-Shrauner, V Afraimovich, N U Ahmed, B Aulbach, E J Avila-Vales, F Battelli, J M Blazquez, L Block, T A Burton, R S Cantrell, C Y Chan, P Collet, R Cushman, M Denker, F N Diacu, Y H Ding, N S A El-Sharif, J E Fornaess, M Frankel, R Galeeva, A Galves, V Gershkovich, M Girardi, L Gotusso, J Graczyk, Y Hino, I Hoveijn, V Hutson, P B Kahn, J Kato, J Keesling, S Keras, V Kolmanovskii, N V Minh, V Mioc, K Mischaikow, M Misiurewicz, J W Mooney, M E Muldoon, S Murakami, M Muraskin, A D Myshkis, F Neuman, J C Newby, Y Nishiura, Z Nitecki, M Ohta, G Osipenko, N Ozalp, M Pollicott, Min Qu, Donal O-Regan, E Romanenko, V Roytburd, L Shaikhet, J Shidawara, N Sibony, W-H Steeb, C Stoica, G Swiatek, T Takaishi, N D Thai Son, R Triggiani, A E Tuma, E H Twizell, M Urbanski; T D Van, A Vanderbauwhede, A Veneziani, G Vickers, X Xiang, T Young, Y Zarmi.

Perturbation theory for linear operators

Springer Science & Business Media

Elementary Calculus

An Infinitesimal Approach

Orange Groove Books

Sir Isaac Newton's Mathematical Principles of Natural Philosophy and His System of the World

Univ of California Press I consider philosophy rather than arts and write not concerning manual but natural powers, and consider chiefly those things which relate to gravity, levity, elastic force, the resistance of fluids, and the like forces, whether attractive or impulsive; and therefore I offer this work as the mathematical principles of philosophy. In the third book I give an example of this in the explication of the System of the World. I derive from celestial phenomena the forces of gravity with which bodies tend to the sun and other planets.

Introduction to Mathematical Optimization

This book is intended to be a teaching aid for students of the courses in Operations Research and Mathematical Optimization for scientific faculties. Some of the basic topics of Operations Research and Optimization are considered: Linear Programming, Integer Linear Programming, Computational Complexity, and Graph Theory. Particular emphasis is given to Integer Linear Programming, with an exposition of the most recent resolution techniques, and in particular of the branch-and-cut method. The work is accompanied by numerous examples and exercises.

Density Functional Theory

Springer Science & Business Media The first Nato Advanced Studies Institute entirely devoted to density functional theory was held in Portugal in September 1983. The proceedings of this School, published in early 1985, is still used as a standard reference covering the basic development of the theory and applications in atomic, molecular, solid state and nuclear physics. However, astonishing progress has been achieved in the intervening years: The foundations of the theory have been extended to cover excited states and time dependent problems more fully, density functional theory of classical liquids and superconducting systems has been addressed and extensions to relativistic, that is, field theoretical systems, as well as a more thorough discussion of magnetic field problems have been presented. In addition, new functionals have been devised, for instance under the heading of generalised gradient expansions, and the number of applications in the traditional fields has steadily increased, in particular in chemistry. Applications in new fields, as for instance the structure of atomic clusters and the marriage of density functional theory with molecular dynamics and simulated annealing, have provided additional impetus to the field of density functional theory.

3D Math Primer for Graphics and Game Development, 2nd Edition

CRC Press This engaging book presents the essential mathematics needed to describe, simulate, and render a 3D world. Reflecting both academic and in-the-trenches practical experience, the authors teach you how to describe objects and their positions, orientations, and trajectories in 3D using mathematics. The text provides an introduction to mathematics for game designers, including the fundamentals of coordinate spaces, vectors, and matrices. It also covers orientation in three dimensions, calculus and dynamics, graphics, and parametric curves.

Advanced Engineering Mathematics

Pearson New International Edition

Appropriate for one- or two-semester Advanced Engineering Mathematics courses in departments of Mathematics and Engineering. This clear, pedagogically rich book develops a strong understanding of the mathematical principles and practices that today's engineers and scientists need to know. Equally effective as either a textbook or reference manual, it approaches mathematical concepts from a practical-use perspective making physical applications more vivid and substantial. Its comprehensive instructional framework supports a conversational, down-to-earth narrative style offering easy accessibility and frequent opportunities for application and reinforcement.

The Fourier Transform and Its Applications Solutions Manual

A Book of Abstract Algebra

Second Edition

Courier Corporation Accessible but rigorous, this outstanding text encompasses all of the topics covered by a typical course in elementary abstract algebra. Its easy-to-read treatment offers an intuitive approach, featuring informal discussions followed by thematically arranged exercises. This second edition features additional exercises to improve student familiarity with applications. 1990 edition.

Vector Calculus

Pearson College Division Normal 0 false false false Vector Calculus, Fourth Edition, uses the language and notation of vectors and matrices to teach multivariable calculus. It is ideal for students with a solid background in single-variable calculus who are capable of thinking in more general terms about the topics in the course. This text is distinguished from others by its readable narrative, numerous figures, thoughtfully selected examples, and carefully crafted exercise sets. Colley includes not only basic and advanced exercises, but also mid-level exercises that form a necessary bridge between the two.

Differentiable Measures and the Malliavin Calculus

American Mathematical Soc. This book provides the reader with the principal concepts and results related to differential properties of measures on infinite dimensional spaces. In the finite dimensional case such properties are described in terms of densities of measures with respect to Lebesgue measure. In the infinite dimensional case new phenomena arise. For the first time a detailed account is given of the theory of differentiable measures, initiated by S. V. Fomin in the 1960s; since then the method has found many various important applications. Differentiable properties are described for diverse concrete classes of measures arising in applications, for example, Gaussian, convex, stable, Gibbsian, and for distributions of random processes. Sobolev classes for measures on finite and infinite dimensional spaces are discussed in detail. Finally, we present the main ideas and results of the Malliavin calculus--a powerful method to study smoothness properties of the distributions of nonlinear functionals on infinite dimensional spaces with measures. The target readership includes mathematicians and physicists whose research is related to measures on infinite dimensional spaces, distributions of random processes, and differential equations in infinite dimensional spaces. The book includes an extensive bibliography on the subject.

An Introduction to Mathematical Modeling

Courier Corporation Accessible text features over 100 reality-based examples pulled from the science, engineering, and operations research fields. Prerequisites: ordinary differential equations, continuous probability. Numerous references. Includes 27 black-and-white figures. 1978 edition.

Modern Algebra (Abstract Algebra)

Krishna Prakashan Media

College Algebra

College Algebra provides a comprehensive exploration of algebraic principles and meets scope and sequence requirements for a typical introductory algebra course. The modular approach and richness of content ensure that the book meets the needs of a variety of courses. College Algebra offers a wealth of examples with detailed, conceptual explanations, building a strong foundation in the material before asking students to apply what they've learned. Coverage and Scope In determining the concepts, skills, and topics to cover, we engaged dozens of highly experienced instructors with a range of student audiences. The resulting scope and sequence proceeds logically while allowing for a significant amount of flexibility in instruction. Chapters 1 and 2 provide both a review and foundation for study of Functions that begins in Chapter 3. The authors recognize that while some institutions may find this material a prerequisite, other institutions have told us that they have a cohort that need the prerequisite skills built into the course. Chapter 1: Prerequisites Chapter 2: Equations and Inequalities Chapters 3-6: The Algebraic Functions Chapter 3: Functions Chapter 4: Linear Functions Chapter 5: Polynomial and Rational Functions Chapter 6: Exponential and Logarithm Functions Chapters 7-9: Further Study in College Algebra Chapter 7: Systems of Equations and Inequalities Chapter 8: Analytic Geometry Chapter 9: Sequences, Probability and Counting Theory

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'.

Mathematical Biology

I. An Introduction

Springer Science & Business Media *Mathematical Biology* is a richly illustrated textbook in an exciting and fast growing field. Providing an in-depth look at the practical use of math modeling, it features exercises throughout that are drawn from a variety of bioscientific disciplines - population biology, developmental biology, physiology, epidemiology, and evolution, among others. It maintains a consistent level throughout so that graduate students can use it to gain a foothold into this dynamic research area.

A Course on Rough Paths

With an Introduction to Regularity Structures

Springer Nature With many updates and additional exercises, the second edition of this book continues to provide readers with a gentle introduction to rough path analysis and regularity structures, theories that have yielded many new insights into the analysis of stochastic differential equations, and, most recently, stochastic partial differential equations. Rough path analysis provides the means for constructing a pathwise solution theory for stochastic differential equations which, in many respects, behaves like the theory of deterministic differential equations and permits a clean break between analytical and probabilistic arguments. Together with the theory of regularity structures, it forms a robust toolbox, allowing the recovery of many classical results without having to rely on specific probabilistic properties such as adaptedness or the martingale property. Essentially self-contained, this textbook puts the emphasis on ideas and short arguments, rather than aiming for the strongest possible statements. A typical reader will have been exposed to upper undergraduate analysis and probability courses, with little more than Itô-integration against Brownian motion required for most of the text. From the reviews of the first edition: "Can easily be used as a support for a graduate course ... Presents in an accessible way the unique point of view of two experts who themselves have largely contributed to the theory" - Fabrice Baudouin in the *Mathematical Reviews* "It is easy to base a graduate course on rough paths on this ... A researcher who carefully works her way through all of the exercises will have a very good impression of the current state of the art" - Nicolas Perkowski in *Zentralblatt MATH*

Dynamic Optimization, Second Edition

The Calculus of Variations and Optimal Control in Economics and Management

Courier Corporation Since its initial publication, this text has defined courses in dynamic optimization taught to economics and management science students. The two-part treatment covers the calculus of variations and optimal control. 1998 edition.

The Absolute Differential Calculus (Calculus of Tensors)

Courier Corporation Written by a distinguished mathematician, this classic examines the mathematical material necessary for a grasp of relativity theory. Covers introductory theories, fundamental quadratic forms, absolute differential calculus, and physical applications. 1926 edition.

Perspectives on Mathematics

The Complete Idiot's Guide to Algebra

Alpha Books Enhanced by easier-to-read graphs and additional practice problems, an introduction to algebra covers the basic principles of mathematics, including linear equations, inequalities, polynomials, exponents, logarithms, word problems, and more, all written in an easy-to-understand style. Original.

Stochastic Integration by Parts and Functional Itô Calculus

Birkhäuser This volume contains lecture notes from the courses given by Vlad Bally and Rama Cont at the Barcelona Summer School on Stochastic Analysis (July 2012). The notes of the course by Vlad Bally, co-authored with Lucia Caramellino, develop integration by

parts formulas in an abstract setting, extending Malliavin's work on abstract Wiener spaces. The results are applied to prove absolute continuity and regularity results of the density for a broad class of random processes. Rama Cont's notes provide an introduction to the Functional Itô Calculus, a non-anticipative functional calculus that extends the classical Itô calculus to path-dependent functionals of stochastic processes. This calculus leads to a new class of path-dependent partial differential equations, termed Functional Kolmogorov Equations, which arise in the study of martingales and forward-backward stochastic differential equations. This book will appeal to both young and senior researchers in probability and stochastic processes, as well as to practitioners in mathematical finance.

Proof and Disproof in Formal Logic

An Introduction for programmers

OUP Oxford *Proof and Disproof in Formal Logic* is a lively and entertaining introduction to formal logic providing an excellent insight into how a simple logic works. Formal logic allows you to check a logical claim without considering what the claim means. This highly abstracted idea is an essential and practical part of computer science. The idea of a formal system—a collection of rules and axioms which define a universe of logical proofs—is what gives us programming languages and modern-day programming. This book concentrates on using logic as a tool: making and using formal proofs and disproofs of particular logical claims. The logic it uses—natural deduction—is very small and very simple; working with it helps you see how large mathematical universes can be built on small foundations. The book is divided into four parts: · Part I "Basics" gives an introduction to formal logic with a short history of logic and explanations of some technical words. · Part II "Formal syntactic proof" show you how to do calculations in a formal system where you are guided by shapes and never need to think about meaning. Your experiments are aided by Jape, which can operate as both inquisitor and oracle. · Part III "Formal semantic disproof" shows you how to construct mathematical counterexamples to show that proof is impossible. Jape can check the counterexamples you build. · Part IV "Program specification and proof" describes how to apply your logical understanding to a real computer science problem, the accurate description and verification of programs. Jape helps, as far as arithmetic allows. Aimed at undergraduates and graduates in computer science, logic, mathematics, and philosophy, the text includes reference to and exercises based on the computer software package Jape, an interactive teaching and research tool designed and hosted by the author that is freely available on the web.

Math Instruction for Students with Learning Problems

Taylor & Francis *Math Instruction for Students with Learning Problems, Second Edition* provides a research-based approach to mathematics instruction designed to build confidence and competence in pre- and in-service PreK-12 teachers. This core textbook addresses teacher and student attitudes toward mathematics, as well as language issues, specific mathematics disabilities, prior experiences, and cognitive and metacognitive factors. The material is rich with opportunities for class activities and field extensions, and the second edition has been fully updated to reference both NCTM and CCSSM standards throughout the text and includes an entirely new chapter on measurement and data analysis.

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.

Mathematics for the Nonmathematician

Courier Corporation Erudite and entertaining overview follows development of mathematics from ancient Greeks to present. Topics include logic and mathematics, the fundamental concept, differential calculus, probability theory, much more. Exercises and problems.

Mind Tools

The Five Levels of Mathematical Reality

Courier Corporation Originally published: Boston: Houghton Mifflin, 1987.

Integral Transforms and Operational Calculus

MDPI Researches and investigations involving the theory and applications of integral transforms and operational calculus are remarkably wide-spread in many diverse areas of the mathematical, physical, chemical, engineering and statistical sciences. This Special Issue contains a total of 36 carefully-selected and peer-reviewed articles which are authored by established researchers from many countries. Included in this Special Issue are review, expository and original research articles dealing with the recent advances on the topics of integral transforms and operational calculus as well as their multidisciplinary applications

An Introduction to Neural Networks

CRC Press Though mathematical ideas underpin the study of neural networks, the author presents the fundamentals without the full mathematical apparatus. All aspects of the field are tackled, including artificial neurons as models of their real counterparts; the geometry of network action in pattern space; gradient descent methods, including back-propagation; associative memory and Hopfield nets; and self-organization and feature maps. The traditionally difficult topic of adaptive resonance theory is clarified within a hierarchical description of its operation. The book also includes several real-world examples to provide a concrete focus. This should enhance its appeal to those involved in the design, construction and management of networks in commercial environments and who wish to improve their understanding of network simulator packages. As a comprehensive and highly accessible introduction to one of the most important topics in cognitive and computer science, this volume should interest a wide range of readers, both students and professionals, in cognitive science, psychology, computer science and electrical engineering.

Backward Stochastic Differential Equations

CRC Press This book presents the texts of seminars presented during the years 1995 and 1996 at the Université Paris VI and is the first attempt to present a survey on this subject. Starting from the classical conditions for existence and unicity of a solution in the most simple case-which requires more than basic stochastic calculus-several refinements on the hypotheses are introduced to obtain more general results.

Essential Mathematics for Games and Interactive Applications

A Programmer's Guide, Second Edition

CRC Press Essential Mathematics for Games and Interactive Applications, 2nd edition presents the core mathematics necessary for sophisticated 3D graphics and interactive physical simulations. The book begins with linear algebra and matrix multiplication and expands on this foundation to cover such topics as color and lighting, interpolation, animation and basic game physics. Essential Mathematics focuses on the issues of 3D game development important to programmers and includes optimization guidance throughout. The new edition Windows code will now use Visual Studio.NET. There will also be DirectX support provided, along with OpenGL - due to its cross-platform nature. Programmers will find more concrete examples included in this edition, as well as additional information on tuning, optimization and robustness. The book has a companion CD-ROM with exercises and a test bank for the academic secondary market, and for main market: code examples built around a shared code base, including a math library covering all the topics presented in the book, a core vector/matrix math engine, and libraries to support basic 3D rendering and interaction.