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Given the risk of earthquakes in many countries, knowing how structural dynamics can be applied to earthquake engineering of structures, both in theory and practice, is a vital aspect of improving the safety of buildings and structures. It can also reduce the number of deaths and injuries and the amount of property damage. The book begins by discussing free vibration of single-degree-of-freedom (SDOF) systems, both damped and undamped, and forced vibration (harmonic force) of SDOF systems. Response to periodic dynamic loadings and impulse loads are also discussed, as are two degrees of freedom linear system response methods and free vibration of multiple degrees of freedom. Further chapters cover time history response by natural mode superposition, numerical solution methods for natural frequencies and mode shapes and differential quadrature, transformation and Finite Element methods for vibration problems. Other topics such as earthquake ground motion, response spectra and earthquake analysis of linear systems are discussed. Structural dynamics of earthquake engineering: theory and application using Mathematica and Matlab provides civil and structural engineers and students with an understanding of the dynamic response of structures to earthquakes and the common analysis techniques employed to evaluate these responses. Worked examples in Mathematica and Matlab are given. Explains the dynamic response of structures to earthquakes including periodic dynamic loadings and impulse loads Examines common analysis techniques such as natural mode superposition, the finite element method and numerical solutions Investigates this important topic in terms of both theory and practise with the inclusion of practical exercise and diagrams

Focusing on the application of mathematics to chemical engineering, Applied Mathematical Methods for Chemical Engineers addresses the setup and verification of mathematical models using experimental or other independently derived data. The book provides an introduction to differential equations common to chemical engi-

neering, followed by examples of first-order and linear second-order ordinary differential equations. Later chapters examine Sturm-Liouville problems, Fourier series, integrals, linear partial differential equations, regular perturbation, combination of variables, and numerical methods emphasizing the method of lines with MATLAB® programming examples. Fully revised and updated, this Third Edition: Includes additional examples related to process control, Bessel Functions, and contemporary areas such as drug delivery Introduces examples of variable coefficient Sturm-Liouville problems both in the regular and singular types Demonstrates the use of Euler and modified Euler methods alongside the Runge-Kutta order-four method Inserts more depth on specific applications such as nonhomogeneous cases of separation of variables Adds a section on special types of matrices such as upper- and lower-triangular matrices Presents a justification for Fourier-Bessel series in preference to a complicated proof Incorporates examples related to biomedical engineering applications Illustrates the use of the predictor-corrector method Expands the problem sets of numerous chapters Applied Mathematical Methods for Chemical Engineers, Third Edition uses worked examples to expose several mathematical methods that are essential to solving real-world process engineering problems.

Written for junior and senior undergraduates, this remarkably clear and accessible treatment covers set theory, the real number system, metric spaces, continuous functions, Riemann integration, multiple integrals, and more. 1968 edition.

The only comprehensive guide to modeling, characterizing, and solving partial differential equations This classic text by Erich Zauderer provides a comprehensive account of partial differential equations and their applications. Dr. Zauderer develops mathematical models that give rise to partial differential equations and describes classical and modern solution techniques. With an emphasis on practical applications, he makes liberal use of real-world examples, explores both linear and nonlinear problems, and provides approximate as well as exact solutions. He also describes

approximation methods for simplifying complicated solutions and for solving linear and nonlinear problems not readily solved by standard methods. The book begins with a demonstration of how the three basic types of equations (parabolic, hyperbolic, and elliptic) can be derived from random walk models. It continues in a less statistical vein to cover an exceptionally broad range of topics, including stabilities, singularities, transform methods, the use of Green's functions, and perturbation and asymptotic treatments. Features that set Partial Differential Equations of Applied Mathematics, Second Edition above all other texts in the field include: Coverage of random walk problems, discontinuous and singular solutions, and perturbation and asymptotic methods More than 800 practice exercises, many of which are fully worked out Numerous up-to-date examples from engineering and the physical sciences Partial Differential Equations of Applied Mathematics, Second Edition is a superior advanced-undergraduate to graduate-level text for students in engineering, the sciences, and applied mathematics. The title is also a valuable working resource for professionals in these fields. Dr. Zauderer received his doctorate in mathematics from the New York University-Courant Institute. Prior to joining the staff of Polytechnic University, he was a Senior Weitzmann Fellow of the Weitzmann Institute of Science in Rehovot, Israel.

Describes how to systematically implement various characteristic mode (CM) theories into designs of practical antenna systems This book examines both theoretical developments of characteristic modes (CMs) and practical developments of CM-based methodologies for a variety of critical antenna designs. The book is divided into six chapters. Chapter 1 provides an introduction and discusses the recent advances of the CM theory and its applications in antenna engineering. Chapter 2 describes the formulation of the characteristic mode theory for perfectly electrically conducting (PEC) bodies and discusses its numerical implementations. Chapter 3 presents the CM theory for PEC structures embedded in multilayered medium and its

applications. Chapter 4 covers recent advances in CM theory for dielectric bodies and also their applications. Chapter 5 discusses the CM theory for N-port networks and its applications to the design of antenna arrays. Finally, Chapter 6 discusses the design of platform-integrated antenna systems using characteristic modes. This book features the following: Introduces characteristic mode theories for various electromagnetic structures including PEC bodies, structures in multilayered medium, dielectric bodies, and N-port networks Examines CM applications in electrically small antennas, microstrip patch antennas, dielectric resonator antennas, multi-port antennas, antenna arrays, and platform mounted antenna systems Discusses numerical algorithms for the implementation of the characteristic mode theories in computer code Characteristic Modes: Theory and Applications in Antenna Engineering will help antenna researchers, engineers, and students find new solutions for their antenna design challenges.

Outstanding undergraduate text provides a thorough understanding of fundamentals and creates the basis for higher-level courses. Numerous examples and extensive exercise sections of varying difficulty, plus answers to selected exercises. 1990 edition.

Drylands cover 41 percent of the earth's terrestrial surface. The urgency of and international response to climate change have given a new place to drylands in terms both of their vulnerability to predicted climate change impacts and their potential contribution to climate change mitigation. This book aims to apply the new scientific insights on complex dryland systems to practical options for development. A new dryland paradigm is built on the resources and capacities of dryland peoples, on new and emergent economic opportunities, on inward investment, and on the best support that dryland science can offer.

The loss and fragmentation of natural habitats is one of the major issues in wildlife management and conservation. Habitat "corridors" are sometimes proposed as an important element within a conservation strategy. Examples are given of corridors both as pathways and as habitats in their own right. Includes detailed reviews of principles relevant to the design and management of corridors, their place in regional approaches to conservation planning, and recommendations for research and management.

* Learn how complex numbers may be used to solve algebraic equations, as well as their geometric interpretation * Theoret-

ical aspects are augmented with rich exercises and problems at various levels of difficulty * A special feature is a selection of outstanding Olympiad problems solved by employing the methods presented * May serve as an engaging supplemental text for an introductory undergrad course on complex numbers or number theory Topology continues to be a topic of prime importance in contemporary mathematics, but until the publication of this book there were few if any introductions to topology for undergraduates. This book remedied that need by offering a carefully thought-out, graduated approach to point set topology at the undergraduate level. To make the book as accessible as possible, the author approaches topology from a geometric and axiomatic standpoint; geometric, because most students come to the subject with a good deal of geometry behind them, enabling them to use their geometric intuition; axiomatic, because it parallels the student's experience with modern algebra, and keeps the book in harmony with current trends in mathematics. After a discussion of such preliminary topics as the algebra of sets, Euler-Venn diagrams and infinite sets, the author takes up basic definitions and theorems regarding topological spaces (Chapter 1). The second chapter deals with continuous functions (mappings) and homeomorphisms, followed by two chapters on special types of topological spaces (varieties of compactness and varieties of connectedness). Chapter 5 covers metric spaces. Since basic point set topology serves as a foundation not only for functional analysis but also for more advanced work in point set topology and algebraic topology, the author has included topics aimed at students with interests other than analysis. Moreover, Dr. Baum has supplied quite detailed proofs in the beginning to help students approaching this type of axiomatic mathematics for the first time. Similarly, in the first part of the book problems are elementary, but they become progressively more difficult toward the end of the book. References have been supplied to suggest further reading to the interested student.

Provides fundamental concepts about the theory, application and various methods involving functional analysis for students, teachers, scientists and engineers. Divided into three parts it covers: Basic facts of linear algebra and real analysis. Normed spaces, contraction mappings, linear operators between normed spaces and fundamental results on these topics. Hilbert spaces and the representation of continuous linear function with applications. In this self-contained book, all the concepts, results and their consequences are moti-

vated and illustrated by numerous examples in each chapter with carefully chosen exercises.

The domain of Communication Disorders has grown exponentially in the last two decades and has come to encompass much more than audiology, speech impediments and early language impairment. The realization that most developmental and learning disorders are language-based or language-related has brought insights from theoretical and empirical linguistics and its clinical applications to the forefront of Communication Disorders science. The current handbook takes an integrated psycholinguistic, neurolinguistic, and sociolinguistic perspective on Communication Disorders by targeting the interface between language and cognition as the context for understanding disrupted abilities and behaviors and providing solutions for treatment and therapy. Researchers and practitioners will be able to find in this handbook state-of-the-art information on typical and atypical development of language and communication (dis)abilities across the human lifespan from infancy to the aging brain, covering all major clinical disorders and conditions in various social and communicative contexts, such as spoken and written language and discourse, literacy issues, bilingualism, and socio-economic status.

This text on complex variables is geared toward graduate students and undergraduates who have taken an introductory course in real analysis. It is a substantially revised and updated edition of the popular text by Robert B. Ash, offering a concise treatment that provides careful and complete explanations as well as numerous problems and solutions. An introduction presents basic definitions, covering topology of the plane, analytic functions, real-differentiability and the Cauchy-Riemann equations, and exponential and harmonic functions. Succeeding chapters examine the elementary theory and the general Cauchy theorem and its applications, including singularities, residue theory, the open mapping theorem for analytic functions, linear fractional transformations, conformal mapping, and analytic mappings of one disk to another. The Riemann mapping theorem receives a thorough treatment, along with factorization of analytic functions. As an application of many of the ideas and results appearing in earlier chapters, the text ends with a proof of the prime number theorem.

Urbanization has long been a focus of bioarchaeological research, but what is missing from the literature is an exploration of the geographic and temporal range

of human biological, demographic, and sociocultural responses to this major shift in settlement pattern. Urbanization is characterized by increased population size and density, and is frequently assumed to produce negative biological effects. However, the relationship between urbanization and human "health" requires careful examination given the heterogeneity that exists within and between urban contexts. Studies of contemporary urbanization have found both positive and negative outcomes, which likely have parallels in past human societies. This volume is unique as there is no current bioarchaeological book addressing urbanization, despite various studies of urbanization having been conducted. Collectively, this volume provides a more holistic understanding of the relationships between urbanization and various aspects of human population health. The insight gained from this volume will provide not only a better understanding of urbanization in our past, but it will also have potential implications for those studying urbanization in contemporary communities.

This text is designed for an intermediate-level, two-semester undergraduate course in mathematical physics. It provides an accessible account of most of the current, important mathematical tools required in physics these days. It is assumed that the reader has an adequate preparation in general physics and calculus. The book bridges the gap between an introductory physics course and more advanced courses in classical mechanics, electricity and magnetism, quantum mechanics, and thermal and statistical physics. The text contains a large number of worked examples to illustrate the mathematical techniques developed and to show their relevance to physics. The book is designed primarily for undergraduate physics majors, but could also be used by students in other subjects, such as engineering, astronomy and mathematics.

This accessible and wide-ranging book is an invaluable introductory guide through the choices to be made when deciding how to report research. *Writing and Presenting Research* covers research written as theses and dissertations; chapters, books, reports and articles in academic, professional or general media such as newspapers; and also reviews the options for presenting research orally as lectures, keynotes, conference papers and even TV game shows. These forms of reporting research have well-established conventions for their formats, but they also have growing numbers of alternative possibilities. This has generated debate about what is, or is not, acceptable, and the aim of this

book is to make this debate more manageable for those wanting to assess which of the conventional or alternative possibilities on offer is most appropriate for reporting their current research. Arranged in easily followed sections enlivened with checklists, style variations, examples and reflection points, *Writing and Presenting Research* has relevance to the social sciences, arts, humanities, natural and applied sciences and law and is an invaluable reference tool for new and experienced researchers alike. *SAGE Study Skills* are essential study guides for students of all levels. From how to write great essays and succeeding at university, to writing your undergraduate dissertation and doing postgraduate research, *SAGE Study Skills* help you get the best from your time at university. Visit the *SAGE Study Skills* hub for tips, resources and videos on study success!

The material presented in this book corresponds to a semester-long course, "Linear Algebra and Differential Equations", taught to sophomore students at UC Berkeley. In contrast with typical undergraduate texts, the book offers a unifying point of view on the subject, namely that linear algebra solves several clearly-posed classification problems about such geometric objects as quadratic forms and linear transformations. This attractive viewpoint on the classical theory agrees well with modern tendencies in advanced mathematics and is shared by many research mathematicians. However, the idea of classification seldom finds its way to basic programs in mathematics, and is usually unfamiliar to undergraduates. To meet the challenge, the book first guides the reader through the entire agenda of linear algebra in the elementary environment of two-dimensional geometry, and prior to spelling out the general idea and employing it in higher dimensions, shows how it works in applications such as linear ODE systems or stability of equilibria. Appropriate as a text for regular junior and honors sophomore level college classes, the book is accessible to high school students familiar with basic calculus, and can also be useful to engineering graduate students.

Relations between groups and sets, results and methods of abstract algebra in terms of number theory and geometry, and non-commutative and homological algebra. Solutions. 2006 edition.

Explores the interrelations between real and complex numbers by adopting both generalization and specialization methods to move between them, while simultaneously examining their analytic and geometric characteristics. Engaging exposition with discussions, remarks, questions, and

exercises to motivate understanding and critical thinking skills. Includes numerous examples and applications relevant to science and engineering students.

Algebraically based approach to vectors, mapping, diffraction, and other topics covers generalized functions, analytic function theory, Hilbert spaces, calculus of variations, boundary value problems, integral equations, more. 1969 edition.

Rich selection of 100 practice problems — with hints and solutions — for students preparing for the William Lowell Putnam and other undergraduate-level mathematical competitions. Features real numbers, differential equations, integrals, polynomials, sets, other topics. Hours of stimulating challenge for math buffs at varying degrees of proficiency. References.

A groundbreaking and comprehensive reference that's been a bestseller since 1970, this new edition provides a broad mathematical survey and covers a full range of topics from the very basic to the advanced. For the first time, a personal tutor CD-ROM is included.

The third edition of this highly acclaimed undergraduate textbook is suitable for teaching all the mathematics for an undergraduate course in any of the physical sciences. As well as lucid descriptions of all the topics and many worked examples, it contains over 800 exercises. New stand-alone chapters give a systematic account of the 'special functions' of physical science, cover an extended range of practical applications of complex variables, and give an introduction to quantum operators. Further tabulations, of relevance in statistics and numerical integration, have been added. In this edition, half of the exercises are provided with hints and answers and, in a separate manual available to both students and their teachers, complete worked solutions. The remaining exercises have no hints, answers or worked solutions and can be used for unaided homework; full solutions are available to instructors on a password-protected web site, www.cambridge.org/9780521679718.

Investigating the complex interplay between tectonics and sedimentation is a key endeavor in modern earth science. Many of the world's leading researchers in this field have been brought together in this volume to provide concise overviews of the current state of the subject. The plate tectonic revolution of the 1960's provided the framework for detailed models on the structure of orogens and basins, summarized in a 1995 textbook edited by Busby and Ingersoll. *Tectonics of Sedimentary Basins: Recent Advances* focuses on key topics or areas where the greatest

strides forward have been made, while also providing on-line access to the comprehensive 1995 book. Breakthroughs in new techniques are described in Section 1, including detrital zircon geochronology, cosmogenic nuclide dating, magnetostratigraphy, 3-D seismic, and basin modelling. Section 2 presents the new models for rift, post-rift, transtensional and strike slip basin settings. Section 3 addresses the latest ideas in convergent margin tectonics, including the sedimentary record of subduction initiation and subduction, flat-slab subduction, and arc-continent collision; it then moves inboard to forearc basins and intra-arc basins, and ends with a series of papers formed under compressional strain regimes, as well as post-orogenic intramontane basins. Section 4 examines the origin of plate interior basins, and the sedimentary record of supercontinent formation. This book is required reading for any advanced student or professional interested in sedimentology, plate tectonics, or petroleum geoscience. Additional resources for this book can be found at: www.wiley.com/go/busby/sedimentarybasins.

This introduction to complex variable methods begins by carefully defining complex numbers and analytic functions, and proceeds to give accounts of complex integration, Taylor series, singularities, residues and mappings. Both algebraic and geometric tools are employed to provide the greatest understanding, with many diagrams illustrating the concepts introduced. The emphasis is laid on understanding the use of methods, rather than on rigorous proofs. Throughout the text, many of the important theoretical results in complex function theory are followed by relevant and vivid examples in physical sciences. This second edition now contains 350 stimulating exercises of high quality, with solutions given to many of them. Material has been updated and additional proofs on some of the important theorems in complex function theory are now included, e.g. the Weierstrass-Casorati theorem. The book is highly suitable for students wishing to learn the elements of complex analysis in an applied context.

The basics of what every scientist and engineer should know, from complex numbers, limits in the complex plane, and complex functions to Cauchy's theory, power series, and applications of residues. 1974 edition. This text explains nontrivial applications of metric space topology to analysis. Covers metric space, point-set topology, and algebraic topology. Includes exercises, selected answers, and 51 illustrations. 1983 edition.

Shorter version of Markushevich's Theory of Functions of a Complex Variable, appropriate for advanced undergraduate and graduate courses in complex analysis. More than 300 problems, some with hints and answers. 1967 edition.

Lucid coverage of the major theories of abstract algebra, with helpful illustrations and exercises included throughout. Unabridged, corrected republication of the work originally published 1971. Bibliography. Index. Includes 24 tables and figures. This book is a printed edition of the Special Issue "Forest Pathology and Plant Health" that was published in *Forests*. Practical text shows how to formulate and solve partial differential equations. Coverage of diffusion-type problems, hyperbolic-type problems, elliptic-type problems, numerical and approximate methods. Solution guide available upon request. 1982 edition.

Topics include the complex plane, basic properties of analytic functions, analytic functions as mappings, analytic and harmonic functions in applications, transform methods. Hundreds of solved examples, exercises, applications. 1990 edition. Appendices.

This book presents a way of learning complex analysis, using Mathematica. Includes CD with electronic version of the book.

The hominin fossil record documents a history of critical evolutionary events that have ultimately shaped and defined what it means to be human, including the origins of bipedalism; the emergence of our genus *Homo*; the first use of stone tools; increases in brain size; and the emergence of *Homo sapiens*, tools, and culture. The Earth's geological record suggests that some evolutionary events were coincident with substantial changes in African and Eurasian climate, raising the possibility that critical junctures in human evolution and behavioral development may have been affected by the environmental characteristics of the areas where hominins evolved. *Understanding Climate's Change on Human Evolution* explores the opportunities of using scientific research to improve our understanding of how climate may have helped shape our species. Improved climate records for specific regions will be required before it is possible to evaluate how critical resources for hominins, especially water and vegetation, would have been distributed on the landscape during key intervals of hominin history. Existing records contain substantial temporal gaps. The book's initiatives are presented in two major research themes: first, determining the impacts of climate change and climate variability on human evolution and

dispersal; and second, integrating climate modeling, environmental records, and biotic responses. *Understanding Climate's Change on Human Evolution* suggests a new scientific program for international climate and human evolution studies that involve an exploration initiative to locate new fossil sites and to broaden the geographic and temporal sampling of the fossil and archeological record; a comprehensive and integrative scientific drilling program in lakes, lake bed outcrops, and ocean basins surrounding the regions where hominins evolved and a major investment in climate modeling experiments for key time intervals and regions that are critical to understanding human evolution. A self-contained text for an introductory course, this volume places strong emphasis on physical applications. Key elements of differential equations and linear algebra are introduced early and are consistently referenced, all theorems are proved using elementary methods, and numerous worked-out examples appear throughout. The highly readable text approaches calculus from the student's viewpoint and points out potential stumbling blocks before they develop. A collection of more than 1,600 problems ranges from exercise material to exploration of new points of theory — many of the answers are found at the end of the book; some of them worked out fully so that the entire process can be followed. This well-organized, unified text is copiously illustrated, amply cross-referenced, and fully indexed.

The third edition of this well known text continues to provide a solid foundation in mathematical analysis for undergraduate and first-year graduate students. The text begins with a discussion of the real number system as a complete ordered field. (Dedekind's construction is now treated in an appendix to Chapter 1.) The topological background needed for the development of convergence, continuity, differentiation and integration is provided in Chapter 2. There is a new section on the gamma function, and many new and interesting exercises are included. This text is part of the Walter Rudin Student Series in *Advanced Mathematics*.

This book arose out of the authors' desire to present Lebesgue integration and Fourier series on an undergraduate level, since most undergraduate texts do not cover this material or do so in a cursory way. The result is a clear, concise, well-organized introduction to such topics as the Riemann integral, measurable sets, properties of measurable sets, measurable functions, the Lebesgue integral, convergence and the Lebesgue integral, pointwise con-

vergence of Fourier series and other subjects. The authors not only cover these topics in a useful and thorough way, they have taken pains to motivate the student by keeping the goals of the theory always in sight, justifying each step of the development in terms of those goals. In addition, whenever possible, new concepts are related to concepts already in the student's

repertoire. Finally, to enable readers to test their grasp of the material, the text is supplemented by numerous examples and exercises. Mathematics students as well as students of engineering and science will find here a superb treatment, carefully thought out and well presented, that is ideal for a one semester course. The only prerequisite is a basic knowledge of ad-

vanced calculus, including the notions of compactness, continuity, uniform convergence and Riemann integration.

Fundamentals of analytic function theory — plus lucid exposition of 5 important applications: potential theory, ordinary differential equations, Fourier transforms, Laplace transforms, and asymptotic expansions. Includes 66 figures.