

Advanced Calculus Theory Problems Defomd

This is a book on many variable calculus. It is the second volume of a set of two. It includes proofs of all theorems presented, either in the text itself, or in an appendix. It also includes a sufficient introduction to linear algebra to allow the accurate presentation of many variable calculus. The use of elementary linear algebra in presenting the topics of multi-variable calculus is more extensive than usual in this book. It makes many of these topics easier to understand and remember. The book will prepare readers for more advanced math courses and also for courses in physical science.

This is a book on single variable calculus including most of the important applications of calculus. It also includes proofs of all theorems presented, either in the text itself, or in an appendix. It also contains an introduction to vectors and vector products which is developed further in Volume 2. While the book does include all the proofs of the theorems, many of the applications are presented more simply and less formally than is often the case in similar titles.

A self-contained, elementary introduction to wavelet theory and applications Exploring the growing relevance of wavelets in the field of mathematics, Wavelet Theory: An Elementary Approach with Applications provides an introduction to the topic, detailing the fundamental concepts and presenting its major impacts in the world beyond academia. Drawing on concepts from calculus and linear algebra, this book helps readers sharpen their mathematical proof writing and reading skills through interesting, real-world applications. The book begins with a brief introduction to the fundamentals of complex numbers and the space of square-integrable functions. Next, Fourier series and the Fourier transform are presented as tools for understanding wavelet analysis and the study of wavelets in the transform domain. Subsequent chapters provide a comprehensive treatment of various types of wavelets and their related concepts, such as Haar spaces, multiresolution analysis, Daubechies wavelets, and biorthogonal wavelets. In addition, the authors include two chapters that carefully detail the transition from wavelet theory to the discrete wavelet transformations. To illustrate the relevance of wavelet theory in the digital age, the book includes two in-depth sections on current applications: the FBI Wavelet Scalar Quantization Standard and image segmentation. In order to facilitate mastery of the content, the book features more than 400 exercises that range from theoretical to computational in nature and are structured in a multi-part format in order to assist readers with the correct proof or solution. These problems provide an opportunity for readers to further investigate various applications of wavelets. All problems are compatible with software packages and computer labs that are available on the book's related Web site, allowing readers to perform various imaging/audio tasks, explore computer wavelet transformations and their inverses, and visualize the applications discussed throughout the book. Requiring only a prerequisite knowledge of linear algebra and calculus, Wavelet Theory is an excellent book for courses in mathematics, engineering, and physics at the upper-undergraduate level. It is also a valuable resource for mathematicians, engineers, and scientists who wish to learn about wavelet theory on an elementary level.

Presto's attempt to impress the town of Forty Winks with a really spectacular trick produces more rabbits than anyone expected.

A Geometric View

A Modern Approach to Classical Theorems of Advanced Calculus

Schaum's Outline of Advanced Calculus, Second Edition

Calculus: Theory And Applications, Volume 1

Advanced Calculus of Several Variables

An accessible, clearly organized survey of the basic topics of measure theory for students and researchers in mathematics, statistics, and physics. In order to fully understand and appreciate advanced probability, analysis, and advanced mathematical statistics, a rudimentary knowledge of measure theory and like subjects must first be obtained. The Theory of Measures and Integration illuminates the fundamental ideas of the subject-fascinating in their own right-for both students and researchers, providing a useful theoretical background as well as a solid foundation for further inquiry. Eric Vestrup's patient and measured text presents the major results of classical measure and integration theory in a clear and rigorous fashion. Besides offering the mainstream fare, the author also offers detailed discussions of extensions, the structure of Borel and Lebesgue sets, set-theoretic considerations, the Riesz representation theorem, and the Hardy-Littlewood theorem, among other topics, employing a clear presentation style that is both evenly paced and user-friendly. Chapters include: * Measurable Functions * The L_p Spaces * The Radon-Nikodym Theorem * Products of Two Measure Spaces * Arbitrary Products of Measure Spaces. Sections conclude with exercises that range in difficulty between easy "finger exercises" and substantial and independent points of interest. These more difficult exercises are accompanied by detailed hints and outlines. They demonstrate optional side paths in the subject as well as alternative ways of presenting the mainstream topics. In writing his proofs and notation, Vestrup targets the person who wants all of the details shown up front. Ideal for graduate students in mathematics, statistics, and physics, as well as strong undergraduates in these disciplines and practicing researchers, The Theory of Measures and Integration proves both an able primary text for a real analysis sequence with a focus on measure theory and a helpful background text for advanced courses in probability and statistics.

Uniting a variety of approaches to the study of integration, a well-known professor presents a single-volume "blend of the particular and the general, of the concrete and the abstract." 1966 edition.

Confusing Textbooks? Missed Lectures? Not Enough Time? Fortunately for you, there's Schaum's Outlines. More than 40 million students have

trusted Schaum's to help them succeed in the classroom and on exams. Schaum's is the key to faster learning and higher grades in every subject. Each Outline presents all the essential course information in an easy-to-follow, topic-by-topic format. You also get hundreds of examples, solved problems, and practice exercises to test your skills. This Schaum's Outline gives you Practice problems with full explanations that reinforce knowledge Coverage of the most up-to-date developments in your course field In-depth review of practices and applications Fully compatible with your classroom text, Schaum's highlights all the important facts you need to know. Use Schaum's to shorten your study time-and get your best test scores! Schaum's Outlines-Problem Solved.

The first part of this book reviews some key topics on multi-variable advanced calculus. The approach presented includes detailed and rigorous studies on surfaces in R^n which comprises items such as differential forms and an abstract version of the Stokes Theorem in R^n . The conclusion section introduces readers to Riemannian geometry, which is used in the subsequent chapters. The second part reviews applications, specifically in variational quantum mechanics and relativity theory. Topics such as a variational formulation for the relativistic Klein-Gordon equation, the derivation of a variational formulation for relativistic mechanics firstly through (semi)-Riemannian geometry are covered. The second part has a more general context. It includes fundamentals of differential geometry. The later chapters describe a new interpretation for the Bohr atomic model through a semi-classical approach. The book concludes with a classical description of the radiating cavity model in quantum mechanics.

Examples and Problems in Advanced Calculus: Real-Valued Functions

Calculus On Manifolds

Third Edition

Calculus on Manifolds

Advanced Calculus

This little book is especially concerned with those portions of 'advanced calculus' in which the subtlety of the concepts and methods makes rigor difficult to attain at an elementary level. The approach taken here uses elementary versions of modern methods found in sophisticated mathematics. The formal prerequisites include only a term of linear algebra, a nodding acquaintance with the notation of set theory, and a respectable first-year calculus course (one which at least mentions the least upper bound (sup) and greatest lower bound (inf) of a set of real numbers). Beyond this a certain (perhaps latent) rapport with abstract mathematics will be found almost essential.

This book includes over 500 most challenging exercises and problems in calculus. Topical problems and exercises are discussed on set theory, numbers, functions, limits and continuity, derivative, integral calculus, Rolle's theorem, mean value theorem, optimization problems, sequences and series. All the seven chapters recall important definitions, theorems and concepts, making this book immensely valuable to undergraduate students of engineering, mathematics, statistics, computer science and basic sciences.

Field Theory and its Classical Problems lets Galois theory unfold in a natural way, beginning with the geometric construction problems of antiquity, continuing through the construction of regular n -gons and the properties of roots of unity, and then on to the solvability of polynomial equations by radicals and beyond. The logical pathway is historic, but the terminology is consistent with modern treatments. No previous knowledge of algebra is assumed. Notable topics treated along this route include the transcendence of e and π , cyclotomic polynomials, polynomials over the integers, Hilbert's irreducibility theorem, and many other gems in classical mathematics. Historical and bibliographical notes complement the text, and complete solutions are provided to all problems.

Summary: This is a book on single variable calculus including most of the important applications of calculus. It also includes proofs of all theorems presented, either in the text itself, or in an appendix. It also contains an introduction to vectors and vector products which is developed further in Volume 2. While the book does include all the proofs of the theorems, many of the applications are presented more simply and less formally than is often the case in similar titles.

General Theory of Functions and Integration

An Elementary Approach with Applications

Theory and Practice

A Comparison of Scientific and Christian Belief

Sturm-Liouville Problems

This textbook is suitable for a course in advanced calculus that promotes active learning through problem solving. It can be used as a base for a Moore method or inquiry based class, or as a guide in a traditional classroom setting where lectures are organized around the presentation of problems and solutions. This book is appropriate for any student who has taken (or is concurrently taking) an introductory course in calculus. The book includes sixteen appendices that review some indispensable prerequisites on techniques of proof writing with special attention to the notation used the course.

This book examines the methods of two potential paths to truth, science (physics) and religion (Christianity). Both contain inherent limitations. Scientists often regard Christians as naïve because they accept subjective facts. Christians regard materialists as blinded by narrow vision. These and other issues in histories of science and Christianity are comparatively examined to discover the most reliable method for identifying truth. Comparative criticism provides deeper insights into both methods rather than a study of each by itself.

Confusing Textbooks? Missed Lectures? Not Enough Time? Fortunately for you, there's Schaum's Outlines. More than 40 million students have trusted Schaum's to help them succeed in the classroom and on exams. Schaum's is the key to faster learning and higher grades in every subject. Each Outline presents all the essential course information in an easy-to-follow, topic-by-topic format. You also get hundreds of examples, solved problems, and practice exercises to test your skills. This Schaum's Outline gives you Practice problems with full explanations that reinforce knowledge Coverage of the most up-to-date developments in your course field In-depth review of practices and applications Fully compatible with your classroom text, Schaum's highlights all the important facts you need to know. Use Schaum's to shorten your study time--and get your best test scores! Schaum's Outlines-Problem Solved.

Tough Test Questions? Missed Lectures? Not Enough Time? Fortunately for you, there's Schaum's. More than 40 million students have trusted Schaum's to help them succeed in the classroom and on exams. Schaum's is the key to faster learning and higher grades in every subject. Each Outline presents all the essential course information in an easy-to-follow, topic-by-topic format. You also get hundreds of examples, solved problems, and practice exercises to test your skills. This Schaum's Outline gives you 1,370 fully solved problems Complete review of all course fundamentals Clear, concise explanations of all Advanced Calculus concepts Fully compatible with your classroom text, Schaum's highlights all the important facts you need to know. Use Schaum's to shorten your study time--and get your best test scores! Topics include: Numbers; Sequences; Functions, Limits, and Continuity; Derivatives; Integrals; Partial Derivatives; Vectors; Applications of Partial Derivatives; Multiple Integrals; Line Integrals, Surface Integrals, and Integral Theorems; Infinite Series; Improper Integrals; Fourier Series; Fourier Integrals; Gamma and Beta Functions; and Functions of a Complex Variable Schaum's Outlines--Problem Solved.

A Differential Forms Approach

Wavelet Theory

Problems in Real Analysis

Political Competition

Advanced Calculus Demystified

Advanced Calculus is intended as a text for courses that furnish the backbone of the student's undergraduate education in mathematical analysis. The goal is to rigorously present the fundamental concepts within the context of illuminating examples and stimulating exercises. This book is self-contained and starts with the creation of basic tools using the completeness axiom. The continuity, differentiability, integrability, and power series representation properties of functions of a single variable are established. The next few chapters describe the topological and metric properties of Euclidean space. These are the basis of a rigorous treatment of differential calculus (including the Implicit Function Theorem and Lagrange Multipliers) for mappings between Euclidean spaces and integration for functions of several real variables. Special attention has been paid to the motivation for proofs. Selected topics, such as the Picard Existence Theorem for differential equations, have been included in such a way that selections may be made while preserving a fluid presentation of the essential material. Supplemented with numerous exercises, Advanced Calculus is a perfect book for undergraduate students of analysis.

Outlines theory and techniques of calculus, emphasizing strong understanding of concepts, and the basic principles of analysis. Reviews elementary and intermediate calculus and features discussions of elementary-point set theory, and properties of continuous functions.

An authorized reissue of the long out of print classic textbook, Advanced Calculus by the late Dr Lynn Loomis and Dr Shlomo Sternberg both of Harvard University has been a revered but hard to find textbook for the advanced calculus course for decades. This book is based on an honors course in advanced calculus that the authors gave in the 1960's. The foundational material, presented in the unstarred sections of Chapters 1 through 11, was normally covered, but different applications of this basic material were stressed from year to year, and the book therefore contains more material than was covered in any one year. It can accordingly be used (with omissions) as a text for a year's course in advanced calculus, or as a text for a three-semester introduction to analysis. The prerequisites are a good grounding in the calculus of one variable from a mathematically rigorous point of view, together with some acquaintance with linear algebra. The reader should be familiar with limit and continuity type arguments and have a certain amount of mathematical sophistication. As possible introductory texts, we mention Differential and Integral Calculus by R Courant, Calculus by T Apostol, Calculus by M Spivak, and Pure Mathematics by G Hardy. The reader should also have some experience with partial derivatives. In overall plan the book divides roughly into a first half which develops the calculus (principally the differential calculus) in the setting of normed vector spaces, and a second half which deals with the calculus of differentiable manifolds.

This book uses elementary versions of modern methods found in sophisticated mathematics to discuss portions of "advanced calculus" in which the subtlety of the concepts and methods makes rigor difficult to attain at an elementary level.

Partial Differential Equations in Action

An Introduction to Applied Mathematics

Theory and Numerical Implementation

Singular Homology Theory

Advanced Calculus: Fundamentals of Mathematics

Gilbert Strang's clear, direct style and detailed, intensive explanations make this textbook ideal as both a course companion and for self-study. Single variable and multivariable calculus are covered in depth. Key examples of the application of calculus to areas such as physics, engineering and economics are included in order to enhance students' understanding. New to the third edition is a chapter on the 'Highlights of calculus', which accompanies the popular video lectures by the author on MIT's OpenCourseWare. These can be accessed from math.mit.edu/~gs.

A NEW APPROACH TO CALCULUS THAT BETTER ENABLES STUDENTS TO PROGRESS TO MORE ADVANCED COURSES AND APPLICATIONS Calculus and Analysis: A Combined Approach bridges the gap between mathematical thinking skills and advanced calculus topics by providing an introduction to the key theory for understanding and working with applications in engineering and the sciences. Through a modern approach that

utilizes fully calculated problems, the book addresses the importance of calculus and analysis in the applied sciences, with a focus on differential equations. Differing from the common classical approach to the topic, this book presents a modern perspective on calculus that follows motivations from Otto Toeplitz's famous genetic model. The result is an introduction that leads to great simplifications and provides a focused treatment commonly found in the applied sciences, particularly differential equations. The author begins with a short introduction to elementary mathematical logic. Next, the book explores the concept of sets and maps, providing readers with a strong foundation for understanding and solving modern mathematical problems. Ensuring a complete presentation, topics are uniformly presented in chapters that consist of three parts: Introductory Motivations presents historical mathematical problems or problems arising from applications that led to the development of mathematical solutions Theory provides rigorous development of the essential parts of the machinery of analysis; proofs are intentionally detailed, but simplified as much as possible to aid reader comprehension Examples and Problems promotes problem-solving skills through application-based exercises that emphasize theoretical mechanics, general relativity, and quantum mechanics Calculus and Analysis: A Combined Approach is an excellent book for courses on calculus and mathematical analysis at the upper-undergraduate and graduate levels. It is also a valuable resource for engineers, physicists, mathematicians, and anyone working in the applied sciences who would like to master their understanding of basic tools in modern calculus and analysis.

Sturm-Liouville problems arise naturally in solving technical problems in engineering, physics, and more recently in biology and the social sciences. These problems lead to eigenvalue problems for ordinary and partial differential equations. Sturm-Liouville Problems: Theory and Numerical Implementation addresses, in a unified way, the key issues that must be faced in science and engineering applications when separation of variables, variational methods, or other considerations lead to Sturm-Liouville eigenvalue problems and boundary value problems.

This book is a high-level introduction to vector calculus based solidly on differential forms. Informal but sophisticated, it is geometrically and physically intuitive yet mathematically rigorous. It offers remarkably diverse applications, physical and mathematical, and provides a firm foundation for further studies.

From Modelling to Theory

Schaum's Outline of Advanced Calculus, Third Edition

Calculus: Theory And Applications

A Text Upon Select Parts of Differential Calculus, Differential Equations, Integral Calculus, Theory of Functions, with Numerous Exercises

Field Theory and Its Classical Problems

This textbook on homology and cohomology theory is geared towards the beginning graduate student. Singular homology theory is developed systematically, avoiding all unnecessary definitions, terminology, and technical machinery. Wherever possible, the geometric motivation behind various algebraic concepts is emphasized. The only formal prerequisites are knowledge of the basic facts of abelian groups and point set topology. Singular Homology Theory is a continuation of the author's earlier book, Algebraic Topology: An Introduction, which presents such important supplementary material as the theory of the fundamental group and a thorough discussion of 2-dimensional manifolds. However, this earlier book is not a prerequisite for understanding Singular Homology Theory.

Intended for students who have already completed a one-year course in elementary calculus, this two-part treatment advances from functions of one variable to those of several variables. Solutions. 1971 edition.

Vector calculus is an essential mathematical tool for performing mathematical analysis of physical and natural phenomena. It is employed in advanced applications in the field of engineering and computer simulations. This textbook covers the fundamental requirements of vector calculus in curricula for college students in mathematics and engineering programs. Chapters start from the basics of vector algebra, real valued functions, different forms of integrals, geometric algebra and the various theorems relevant to vector calculus and differential forms. Readers will find a concise and clear study of vector calculus, along with several examples, exercises, and a case study in each chapter. The solutions to the exercises are also included at the end of the book. This is an ideal book for students with a basic background in mathematics who wish to learn about advanced calculus as part of their college curriculum and equip themselves with the knowledge to apply theoretical concepts in practical situations.

Suitable for a one- or two-semester course, Advanced Calculus: Theory and Practice expands on the material covered in elementary calculus and presents this material in a rigorous manner. The text improves students' problem-solving and proof-writing skills, familiarizes them with the historical development of calculus concepts, and helps them understand the connections among different topics. The book takes a motivating approach that makes ideas less abstract to students. It explains how various topics in calculus may seem unrelated but in reality have common roots. Emphasizing historical perspectives, the text gives students a glimpse into the development of calculus and its ideas from the age of Newton and Leibniz to the twentieth century. Nearly 300 examples lead to important theorems as well as help students develop the necessary skills to closely examine the theorems. Proofs are also presented in an accessible way to students. By strengthening skills gained through elementary calculus, this textbook leads students toward mastering calculus techniques. It will help them succeed in their future mathematical or engineering studies.

A Problems Based Course in Advanced Calculus

Theory and Applications

A Combined Approach

Calculus and Analysis

An Introduction to Modern Analysis

Advanced Calculus of Several Variables provides a conceptual treatment of multivariable calculus. This book emphasizes the interplay of geometry, analysis through linear algebra, and approximation of nonlinear mappings by linear ones. The classical applications and computational methods that are responsible for much of the interest and importance of calculus are also considered. This text is organized into six chapters. Chapter I deals with linear algebra and geometry of Euclidean n -space R^n . The multivariable differential calculus is treated in Chapters II and III, while multivariable integral calculus is covered in Chapters IV and V. The last chapter is devoted to venerable problems of the calculus of variations. This publication is intended for students who have completed a standard introductory calculus sequence.

Advanced Calculus Revised World Scientific Publishing Company

REA's Advanced Calculus Problem Solver Each Problem Solver is an insightful and essential study and solution guide chock-full of clear, concise problem-solving gems. Answers to all of your questions can be found in one convenient source from one of the most trusted names in reference solution guides. More useful, more practical, and more informative, these study aids are the best review books and textbook companions available. They're perfect for undergraduate and graduate studies. This highly useful reference is the finest overview of advanced calculus currently available, with hundreds of calculus problems that cover everything from point set theory and vector spaces to theories of differentiation and integrals. Each problem is clearly solved with step-by-step detailed solutions.

With a fresh geometric approach that incorporates more than 250 illustrations, this textbook sets itself apart from all others in advanced calculus. Besides the classical capstones--the change of variables formula, implicit and inverse function theorems, the integral theorems of Gauss and Stokes--the text treats other important topics in differential analysis, such as Morse's lemma and the Poincaré lemma. The ideas behind most topics can be understood with just two or three variables. The book incorporates modern computational tools to give visualization real power. Using 2D and 3D graphics, the book offers new insights into fundamental elements of the calculus of differentiable maps. The geometric theme continues with an analysis of the physical meaning of the divergence and the curl at a level of detail not found in other advanced calculus books. This is a textbook for undergraduates and graduate students in mathematics, the physical sciences, and economics. Prerequisites are an introduction to linear algebra and multivariable calculus. There is enough material for a year-long course on advanced calculus and for a variety of semester courses--including topics in geometry. The measured pace of the book, with its extensive examples and illustrations, make it especially suitable for independent study.

Schaums Outline of Advanced Calculus, Second Edition

Define Universe and Give Two Examples

Advanced Calculus and its Applications in Variational Quantum Mechanics and Relativity Theory

Advanced Calculus on the Real Axis

Problems in Real Analysis: Advanced Calculus on the Real Axis features a comprehensive collection of challenging problems in mathematical analysis that aim to promote creative, non-standard techniques for solving problems. This self-contained text offers a host of new mathematical tools and strategies which develop a connection between analysis and other mathematical disciplines, such as physics and engineering. A broad view of mathematics is presented throughout; the text is excellent for the classroom or self-study. It is intended for undergraduate and graduate students in mathematics, as well as for researchers engaged in the interplay between applied analysis, mathematical physics, and numerical analysis.

Demonstrating analytical and numerical techniques for attacking problems in the application of mathematics, this well-organized, clearly written text presents the logical relationship and fundamental notations of analysis. Buck discusses analysis not solely as a tool, but as a subject in its own right. This skill-building volume familiarizes students with the language, concepts, and standard theorems of analysis, preparing them to read the mathematical literature on their own. The text revisits certain portions of elementary calculus and gives a systematic, modern approach to the differential and integral calculus of functions and transformations in several variables, including an introduction to the theory of differential forms. The material is structured to benefit those students whose interests lean toward either research in mathematics or its applications.

Advanced Calculus: An Introduction to Modern Analysis, an advanced undergraduate textbook, provides mathematics majors, as well as students who need mathematics in their field of study, with an introduction to the theory and applications of elementary analysis. The text presents, in an accessible form, a carefully maintained balance between abstract concepts and applied results of significance that serves to bridge the gap between the two- or three-semester calculus sequence and senior/graduate level courses in the theory and applications of ordinary and partial differential equations, complex variables, numerical methods, and measure and integration theory. The book focuses on topological concepts, such as compactness, connectedness, and metric spaces, and topics from analysis including Fourier series, numerical analysis, complex integration, generalized functions, and Fourier and Laplace transforms. Applications from genetics, spring systems, enzyme transfer, and a thorough introduction to the classical vibrating string, heat transfer, and brachistochrone problems illustrate this book's usefulness to the non-mathematics major. Extensive problem sets found throughout the book test the student's understanding of the topics and help develop the student's ability to handle more abstract mathematical ideas. Advanced Calculus: An Introduction to Modern Analysis is intended for junior- and senior-level undergraduate students in mathematics, biology, engineering, physics, and other related disciplines. An excellent textbook for a one-year course in advanced calculus, the methods employed in this text will increase students' mathematical maturity and prepare them solidly for senior/graduate level topics. The wealth of materials in the text allows the instructor to select topics that are of special interest to the student. A two- or three-semester calculus sequence is required for successful use of this book.

Your INTEGRAL tool for mastering ADVANCED CALCULUS Interested in going further in calculus but don't where to begin? No problem! With Advanced Calculus Demystified, there's no limit to how much you will learn. Beginning with an overview of functions of multiple variables and their graphs, this book covers the fundamentals, without spending too much time on rigorous proofs. Then you will move through more complex topics including partial derivatives, multiple integrals, parameterizations, vectors, and gradients, so you'll be able to solve difficult problems with ease. And, you can test yourself at the end of every chapter for calculated proof that you're mastering this subject, which is the gateway to many exciting areas of

mathematics, science, and engineering. This fast and easy guide offers: Numerous detailed examples to illustrate basic concepts Geometric interpretations of vector operations such as div, grad, and curl Coverage of key integration theorems including Green's, Stokes', and Gauss' Quizzes at the end of each chapter to reinforce learning A time-saving approach to performing better on an exam or at work Simple enough for a beginner, but challenging enough for a more advanced student, Advanced Calculus Demystified is one book you won't want to function without!

Calculus

The Theory of Measures and Integration

Advanced Calculus Problem Solver

A Modern Approach To Classical Theorems Of Advanced Calculus

Revised

John Roemer presents a unified and rigorous theory of political competition between parties and he models the theory under many specifications, including whether parties are policy oriented or oriented toward winning, whether they are certain or uncertain about voter preferences, and whether the policy space is uni- or multidimensional.

This book is designed as an advanced undergraduate or a first-year graduate course for students from various disciplines. The main purpose is on the one hand to train students to appreciate the interplay between theory and modeling in problems arising in the applied sciences, and on the other hand to give them a solid theoretical background for numerical methods. At the end of each chapter, a number of exercises at different level of complexity is included