Solutions To Selected Problems Springer

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'.

This textbook offers a unique introduction to hydraulics and fluid mechanics through more than 100 exercises, with guided solutions, which students will find valuable in preparation for their preliminary or qualifying exams and for testing their grasp of the subject. In some exercises two different solution methods are proposed, to highlight the fact that the level of complexity of the calculations is often linked to the choice of method, though in most cases only the simplest method is presented. The exercises are organized by subject, covering forces on planes and curved surfaces; floating bodies; exercises that require the application of linear and angular momentum balancing in inertial and non-inertial references; pipeline systems, with particular applications to industrial plants; hydraulic systems with machines (pumps and turbines); transient phenomena in pipelines; and uniform and gradually varied flows in open channels. The book also features appendices that contain selected data and formulas of practical interest. Instructors of courses that address one or all of the above topics will find the exercises of great help in preparing their courses, while researchers will find the book useful as an accessible summary of the topics covered.

Inverse problems are concerned with determining causes for observed or desired effects. Problems of this type appear in many application fields both in science and in engineering. The mathematical modelling of inverse problems usually leads to ill-posed problems, i.e., problems where solutions need not exist, need not be unique or may depend discontinuously on the data. For this reason, numerical methods for solving inverse problems are especially difficult, special methods have to be developed which are known under the term "regularization methods". This volume contains twelve survey papers about solution methods for inverse and ill-posed problems and about their application to specific types of inverse problems, e.g., in scattering theory, in tomography and medical applications, in geophysics and in image processing. The papers have been written by leading experts in the field and provide an up-to-date account of solution methods for inverse problems.

This monograph covers some selected problems of positive fractional 1D and 2D linear systems. It is an extended and modified English version of its preceding Polish edition published by Technical University of Bialystok in 2009. This book is based on the lectures delivered by the author to the Ph.D. students of the Faculty of Electrical Engineering of Bialystok University of Technology and of Warsaw University of Technology and on invited lectures in several foreign universities in the last three years.

This work is about inequalities which play an important role in mathematical Olympiads. It contains 175 solved problems in the form of exercises and, in addition, 310 solved problems. The book also covers the theoretical background of the most important theorems and techniques required for solving inequalities. It is written for all middle and high-school students, as well as for graduate and undergraduate students. School teachers and trainers for mathematical competitions will also gain benefit from this book.

This text presents differential forms from a geometric perspective accessible at the undergraduate level. It begins with basic concepts such as partial differentiation and multiple integration and gently develops the entire machinery of differential forms. The subject is approached with the idea that complex concepts can be built up by analogy from simpler cases, which, being inherently geometric, often can be best understood visually. Each new concept is presented with a natural picture that students can easily grasp. Algebraic properties then follow. The book contains excellent motivation, numerous illustrations and solutions to selected problems.

This book comprises an impressive collection of problems that cover a variety of carefully selected topics on the core of the theory of dynamical systems. Aimed at the graduate/upper undergraduate level, the emphasis is on dynamical systems with discrete time. In addition to the basic theory, the topics include topological, low-dimensional, hyperbolic and symbolic dynamics, as well as basic ergodic theory. As in other areas of mathematics, one can gain the first working knowledge of a topic by solving selected problems. It is rare to find large collections of problems in an advanced field of study much less to discover accompanying detailed solutions. This text fills a gap and can be used as a strong companion to an analogous dynamical systems textbook such as the authors’ own Dynamical Systems (Universitext, Springer) or another text designed for a one- or two-semester advanced undergraduate/graduate course. The book is also intended for independent study. Problems often begin with specific cases and then move on to general results, following a natural path of learning. They are also well-graded in terms of increasing the challenge to the reader. Anyone who works through the theory and problems in Part I will have acquired the background and techniques needed to do advanced studies in this area. Part II includes complete solutions to every problem given in Part I with each conveniently restated. Beyond basic prerequisites from linear algebra, differential and integral calculus, and complex analysis and topology, in each chapter the authors recall the notions and results (without proofs) that are necessary to treat the challenges set for that chapter, thus making the text self-contained.

This textbook is intended for a one semester course in complex analysis for upper level undergraduates in mathematics. Applications, primary motivations for this text, are presented hand-in-hand with theory enabling this text to serve well in courses for students in engineering or applied sciences. The overall aim in designing this text is to accommodate students of different mathematical backgrounds and to achieve a balance between presentations of rigorous mathematical proofs and applications. The text is adapted to enable maximum flexibility to instructors and to students who may also choose to progress through the material outside of coursework. Detailed examples may be covered in one course, giving the instructor the option to choose those that are best suited for discussion. Examples showcase a variety of problems with completely worked out solutions, assisting students in working through the exercises. The numerous exercises vary in difficulty from simple applications of formulas to more advanced project-type problems. Detailed hints accompany the more challenging problems. Multi-part exercises may be assigned to individual students, to groups as projects, or serve as further illustrations for the instructor. Widely used graphics clarify both concrete and abstract concepts, helping students visualize the proofs of many results. Freely accessible solutions to every-other-odd exercise are posted to the book’s Springer website. Additional solutions for instructors’ use may be obtained by contacting the authors directly.

It has been 15 years since the first edition of Stochastic Integration and Differential Equations, A New Approach appeared, and in those years many other texts on the same subject have been published, often with connections to applications, especially mathematical finance. Yet in spite of the apparent simplicity of approach, none of these books has used the functional analytic method of presenting semimartingales and stochastic integration. Thus a 2nd edition seems worthwhile and timely, though it is no longer appropriate to call it "a new approach". The new edition has several significant changes, most prominently the addition of exercises for solution. These are intended to supplement the text, but lemmas needed in a proof are never relegated to the exercises. Many of the exercises have been tested by graduate students at Purdue and Cornell Universities. Chapter 3 has been completely redone, with a new, more intuitive and simultaneously elementary proof of the fundamental Doob-Meyer decomposition theorem, the more general version of the Girsanov theorem due to Lenglart, the Kazamaki-Novikov criteria for exponential local martingales to be martingales, and a modern treatment of compensators. Chapter 4 treats sigma martingales (important in finance theory) and gives a more comprehensive treatment of martingale representation, including both the Jacod-Yor theory and Emery’s examples of martingales that actually have martingale representation (thus going beyond the standard cases of Brownian motion and the compensated Poisson process). New topics added include an introduction to the theory of the expansion of filtrations, a treatment of the Fefferman martingale inequality, and that the dual space of the martingale space H^1 can be identified with BMO martingales. Solutions to selected exercises are available at the web site of the author, with current URL http://www.orie.cornell.edu/~protter/books.html.

This book is intended for the Mathematical Olympiad students who wish to prepare for the study of inequalities, a topic now of frequent use at various levels of mathematical competitions. In this volume we present both classic inequalities and the more useful inequalities for confronting and solving optimization problems. An important part of this book deals with geometric inequalities and this fact makes a big difference with respect to most of the books that deal with this topic in the mathematical olympiad. The book has been organized in four chapters which have each of them a different character. Chapter 1 is dedicated to present basic inequalities. Most of them are numerical inequalities generally lacking any geometric meaning. However, where it is possible to provide a geometric interpretation, we include it as we go along. We emphasize the importance of some of these inequalities, such as the inequality between the arithmetic mean and the geometric mean, the Cauchy-Schwarz inequality, the rearrangementinequality, the Jensen inequality, the Muirhead theorem, among others. For all these, besides giving the proof, we present several examples that show how to use them in mathematical olympiad problems. We also emphasize how the substitution strategy is used to deduce several inequalities.

No pleasure lasts long unless there is variety in it. Publilius Syrus, Moral Sayings We've been very fortunate to receive fantastic feedback from our readers during the last four years, since the first edition of How to Solve It: Modern Heuristics was published in 1999. It's heartening to know that so many people appreciated the book and, even more importantly, were using the book to help them solve their problems. One professor, who published a review of the book, said that his students had given the best course reviews he'd seen in 15 years when using our text. There can be hardly any better praise, except to add that one of the book reviews published in a SIAM journal received the best review award as well. We greatly appreciate your kind words and personal comments that you sent, including the few cases where you found some typographical or other errors. Thank you all for this wonderful support.

This book is intended to be used as a textbook for graduate students studying theoretical computer science. It can also be used as a reference book for researchers in the area of design and analysis of approximation algorithms. Design and Analysis of Approximation Algorithms is a graduate course in theoretical computer science taught widely in the universities, both in the United States and abroad. There are, however, very few textbooks available for this course. Among those available in the market, most books follow a problem-oriented format; that is, they collected many important combinatorial optimization problems and their approximation algorithms, and organized them based on the types, or applications, of problems, such as geometric-type problems, algebraic-type problems, etc. Such arrangement of materials is perhaps convenient for a researcher to look for the problems and algorithms related to his/her work, but is difficult for a student to capture the ideas underlying the various algorithms. In the new book proposed here, we follow a more structured, technique-oriented presentation. We organize approximation algorithms into different chapters, based on the design techniques for the algorithms, so that the reader can study approximation algorithms of the same nature together. It helps the reader to better understand the design and analysis techniques for approximation algorithms, and also helps the teacher to present the ideas and techniques of approximation algorithms in a more unified way.

A unique collection of competition problems from over twenty major national and international mathematical competitions for high school students. Written for trainers and participants of contests of all levels up to the highest level, this will appeal to high school teachers conducting a mathematics club who need a range of simple to complex problems and to those instructors wishing to pose a "problem of the week", thus bringing a creative atmosphere into the classrooms. Equally, this is a must-have for individuals interested in solving difficult and challenging problems. Each chapter starts with typical examples illustrating the central concepts and is followed by a number of carefully selected problems and their solutions. Most of the solutions are complete, but some merely point to the road leading to the final solution. In addition to being a valuable resource of mathematical problems and solution strategies, this is the most complete training book on the market.

"Primarily intended for a first-year undergraduate course in programming"--Page 4 of cover.

This introduction can be used, at the beginning graduate level, for a one-semester course on probability theory or for self-direction without benefit of a formal course; the measure theory needed is developed in the text. It will also be useful for students and teachers in related areas such as finance theory, electrical engineering, and operations research. The text covers the essentials in a directed and lean way with 28 short chapters, and assumes only an undergraduate background in mathematics. Readers are taken right up to a knowledge of the basics of Martingale Theory, and the interested student will be ready to continue with the study of more advanced topics, such as Brownian Motion and Ito Calculus, or Statistical Inference.

The book discusses the solutions to nonlinear ordinary differential equations (ODEs) using analytical and numerical approximation methods. Recently, analytical approximation methods have been largely used in solving linear and nonlinear lower-order ODEs. It also discusses using these methods to solve some strong nonlinear ODEs. There are two chapters devoted to solving nonlinear ODEs using numerical methods, as in practice high-dimensional systems of nonlinear ODEs that cannot be solved by analytical approximate methods are common. Moreover, it studies analytical and numerical techniques for the treatment of parameter-depending ODEs. The book explains various methods for solving nonlinear-oscillator and structural-system problems, including the energy balance method, harmonic balance method, amplitude frequency formulation, variational iteration method, homotopy perturbation method, iteration perturbation method, homotopy analysis method, simple and multiple shooting method, and the nonlinear stabilized march method. This book comprehensively investigates various new analytical and numerical approximation techniques that are used in solving nonlinear-oscillator and structural-system problems. Students often rely on the finite element method to such an extent that on graduation they have little or no knowledge of alternative methods of solving problems. To rectify this, the book introduces several new approximation techniques.

Therearemanyexcellenttextsonelementarydi?erentialequationsdesignedfor the standard sophomore course. However, in spite of the fact that most courses are one semester in length, the texts have evolved into calculus-like pres- tations that include a large collection of methods and applications, packaged with student manuals, and Web-based notes, projects, and supplements. All of this comes in several hundred pages of text with busy formats. Most students do not have the time or desire to read voluminous texts and explore internet supplements. The format of this di?erential equations book is di?erent; it is a one-semester, brief treatment of the basic ideas, models, and solution methods. Itslimitedcoverageplacesitsomewherebetweenanoutlineandadetailedte- book. I have tried to write concisely, to the point, and in plain language. Many worked examples and exercises are included. A student who works through this primer will have the tools to go to the next level in applying di?erential eq- tions to problems in engineering, science, and applied mathematics. It can give some instructors, who want more concise coverage, an alternative to existing texts.

This book provides a rigorous introduction to the basic aspects of the theory of linear estimation and hypothesis testing, covering the necessary prerequisites in matrices, multivariate normal distribution and distributions of quadratic forms along the way. It will appeal to advanced undergraduate and first-year graduate students, research mathematicians and statisticians.

The implicit function theorem is one of the most important theorems in analysis and its many variants are basic tools in partial differential equations and numerical analysis. This second edition of Implicit Functions and Solution Mappings presents an updated and more complete picture of the field by including solutions of problems that have been solved since the first edition was published, and places old and new results in a broader perspective. The purpose of this self-contained work is to provide a reference on the topic and to provide a unified collection of a number of results which are currently scattered throughout the literature. Updates to this edition include new sections in almost all chapters, new exercises and examples, updated commentaries to chapters and an enlarged index and references section.

This third volume in Vladimir Tkachuk's series on Cp-theory problems applies all modern methods of Cp-theory to study compactness-like properties in function spaces and introduces the reader to the theory of compact spaces widely used in Functional Analysis. The text is designed to bring a dedicated reader from basic topological principles to the frontiers of modern research covering a wide variety of topics in Cp-theory and general topology at the professional level. The first volume, Topological and Function Spaces © 2011, provided an introduction from scratch to Cp-theory and general topology, preparing the reader for a professional understanding of Cp-theory in the last section of its main text. The second volume, Special Features of Function Spaces © 2014, continued from the first, giving reasonably complete coverage of Cp-theory, systematically introducing each of the major topics and providing 500 carefully selected problems and exercises with complete solutions. This third volume is self-contained and works in tandem with the other two, containing five hundred carefully selected problems and solutions. It can also be considered as an introduction to advanced set theory and descriptive set theory, presenting diverse topics of the theory of function spaces with the topology of point wise convergence, or Cp-theory which exists at the intersection of topological algebra, functional analysis and general topology.

This book of problems is designed to challenge students learning probability. Each chapter is divided into three parts: Problems, Hints, and Solutions. All Problems sections include expository material, making the book self-contained. Definitions and statements of important results are interlaced with relevant problems. The only prerequisite is basic algebra and calculus.

This handbook provides comprehensive treatment of the current state of glass science from the leading experts in the field. Opening with an enlightening contribution on the history of glass, the volume is then divided into eight parts. The first part covers fundamental properties, from the current understanding of the thermodynamics of the amorphous state, kinetics, and linear and nonlinear optical properties through colors, photosensitivity, and chemical durability. The second part provides dedicated chapters on each individual glass type, covering traditional systems like silicates and other oxide systems, as well as novel hybrid amorphous materials and spin glasses. The third part features detailed descriptions of modern characterization techniques for understanding this complex state of matter. The fourth part covers modeling, from first-principles calculations through molecular dynamics simulations, and statistical modeling. The fifth part presents a range of laboratory and industrial glass processing methods. The remaining parts cover a wide and representative range of applications areas from optics and photonics through environment, energy, architecture, and sensing. Written by the leading international experts in the field, the Springer Handbook of Glass represents an invaluable resource for graduate students through academic and industry researchers working in photonics, optoelectronics, materials science, energy, architecture, and more.

"Problem-Solving and Selected Topics in Euclidean Geometry: in the Spirit of the Mathematical Olympiads" contains theorems which are of particular value for the solution of geometrical problems. Emphasis is given in the discussion of a variety of methods, which play a significant role for the solution of problems in Euclidean Geometry. Before the complete solution of every problem, a key idea is presented so that the reader will be able to provide the solution. Applications of the basic geometrical methods which include analysis, synthesis, construction and proof are given. Selected problems which have been given in mathematical olympiads or proposed in short lists in IMO's are discussed. In addition, a number of problems proposed by leading mathematicians in the subject are included here. The book also contains new problems with their solutions. The scope of the publication of the present book is to teach mathematical thinking through Geometry and to provide inspiration for both students and teachers to formulate "positive" conjectures and provide solutions.

This student-friendly textbook encourages the development of programming skills through active practice by focusing on exercises that support hands-on learning. The Python Workbook provides a compendium of 186 exercises, spanning a variety of academic disciplines and everyday situations. Solutions to selected exercises are also provided, supported by brief annotations that explain the technique used to solve the problem, or highlight a specific point of Python syntax. This enhanced new edition has been thoroughly updated and expanded with additional exercises, along with concise introductions that outline the core concepts needed to solve them. The exercises and solutions require no prior background knowledge, beyond the material covered in a typical introductory Python programming course. Features: uses an accessible writing style and easy-to-follow structure; includes a mixture of classic exercises from the fields of computer science and mathematics, along with exercises that connect to other academic disciplines; presents the solutions to approximately half of the exercises; provides annotations alongside the solutions, which explain the approach taken to solve the problem and relevant aspects of Python syntax; offers a variety of exercises of different lengths and difficulties; contains exercises that encourage the development of programming skills using if statements, loops, basic functions, lists, dictionaries, files, and recursive functions. Undergraduate students enrolled in their first programming course and wishing to enhance their programming abilities will find the exercises and solutions provided in this book to be ideal for their needs.

This work, now in a thoroughly revised second edition, presents the economic foundations of financial markets theory from a mathematically rigorous standpoint and offers a self-contained critical discussion based on empirical results. It is the only textbook on the subject to include more than two hundred exercises, with detailed solutions to selected exercises. Financial

Markets Theory covers classical asset pricing theory in great detail, including utility theory, equilibrium theory, portfolio selection, mean-variance portfolio theory, CAPM, CCAPM, APT, and the Modigliani-Miller theorem. Starting from an analysis of the empirical evidence on the theory, the authors provide a discussion of the relevant literature, pointing out the main advances in classical asset pricing theory and the new approaches designed to address asset pricing puzzles and open problems (e.g., behavioral finance). Later chapters in the book contain more advanced material, including on the role of information in financial markets, non-classical preferences, noise traders and market microstructure. This textbook is aimed at graduate students in mathematical finance and financial economics, but also serves as a useful reference for practitioners working in insurance, banking, investment funds and financial consultancy. Introducing necessary tools from microeconomic theory, this book is highly accessible and completely self-contained. Advance praise for the second edition: "Financial Markets Theory is comprehensive, rigorous, and yet highly accessible. With their second edition, Barucci and Fontana have set an even higher standard!"Darrell Duffie, Dean Witter Distinguished Professor of Finance, Graduate School of Business, Stanford University "This comprehensive book is a great self-contained source for studying most major theoretical aspects of financial economics. What makes the book particularly useful is that it provides a lot of intuition, detailed discussions of empirical implications, a very thorough survey of the related literature, and many completely solved exercises. The second edition covers more ground and provides many more proofs, and it will be a handy addition to the library of every student or researcher in the field."Jaksa Cvitanic, Richard N. Merkin Professor of Mathematical Finance, Caltech "The second edition of Financial Markets Theory by Barucci and Fontana is a superb achievement that knits together all aspects of modern finance theory, including financial markets microstructure, in a consistent and self-contained framework. Many exercises, together with their detailed solutions, make this book indispensable for serious students in finance."Michel Crouhy, Head of Research and Development, NATIXIS

The Springer Handbook for Computational Intelligence is the first book covering the basics, the state-of-the-art and important applications of the dynamic and rapidly expanding discipline of computational intelligence. This comprehensive handbook makes readers familiar with a broad spectrum of approaches to solve various problems in science and technology. Possible approaches include, for example, those being inspired by biology, living organisms and animate systems. Content is organized in seven parts: foundations; fuzzy logic; rough sets; evolutionary computation; neural networks; swarm intelligence and hybrid computational intelligence systems. Each Part is supervised by its own Part Editor(s) so that high-quality content as well as completeness are assured.

Highlighting the latest advances in stochastic analysis and its applications, this volume collects carefully selected and peer-reviewed papers from the 5th International Conference on Stochastic Methods (ICSM-5), held in Moscow, Russia, November 23-27, 2020. The contributions deal with diverse topics such as stochastic analysis, stochastic methods in computer science, analytical modeling, asymptotic methods and limit theorems, Markov processes, martingales, insurance and financial mathematics, queueing theory and stochastic networks, reliability theory, risk analysis, statistical methods and applications, machine learning and data analysis. The 29 articles in this volume are a representative sample of the 87 high-quality papers accepted and presented during the conference. The aim of the ICSM-5 conference is to promote the collaboration of researchers from Russia and all over the world, and to contribute to the development of the field of stochastic analysis and applications of stochastic models.

This handbook incorporates new developments in automation. It also presents a widespread and well-structured conglomeration of new emerging application areas, such as medical systems and health, transportation, security and maintenance, service, construction and retail

as well as production or logistics. The handbook is not only an ideal resource for automation experts but also for people new to this expanding field.
InequalitiesTheorems, Techniques and Selected ProblemsSpringer Science & Business Media
The book is a primer of the theory of Ordinary Differential Equations. Each chapter is completed by a broad set of exercises; the reader will also find a set of solutions of selected exercises. The book contains many interesting examples as well (like the equations for the electric circuits, the pendulum equation, the logistic equation, the Lotka-Volterra system, and many other) which introduce the reader to some interesting aspects of the theory and its applications. The work is mainly addressed to students of Mathematics, Physics, Engineering, Statistics, Computer Sciences, with knowledge of Calculus and Linear Algebra, and contains more advanced topics for further developments, such as Laplace transform; Stability theory and existence of solutions to Boundary Value problems. A complete Solutions Manual, containing solutions to all the exercises published in the book, is available. Instructors who wish to adopt the book may request the manual by writing directly to one of the authors.
Lie groups and Lie algebras have become essential to many parts of mathematics and theoretical physics, with Lie algebras a central object of interest in their own right. This book provides an elementary introduction to Lie algebras based on a lecture course given to fourth-year undergraduates. The only prerequisite is some linear algebra and an appendix summarizes the main facts that are needed. The treatment is kept as simple as possible with no attempt at full generality. Numerous worked examples and exercises are provided to test understanding, along with more demanding problems, several of which have solutions. Introduction to Lie Algebras covers the core material required for almost all other work in Lie theory and provides a self-study guide suitable for undergraduate students in their final year and graduate students and researchers in mathematics and theoretical physics.
This text presents a graduate-level introduction to differential geometry for mathematics and physics students. The exposition follows the historical development of the concepts of connection and curvature with the goal of explaining the Chern–Weil theory of characteristic classes on a principal bundle. Along the way we encounter some of the high points in the history of differential geometry, for example, Gauss' Theorema Egregium and the Gauss–Bonnet theorem. Exercises throughout the book test the reader’s understanding of the material and sometimes illustrate extensions of the theory. Initially, the prerequisites for the reader include a passing familiarity with manifolds. After the first chapter, it becomes necessary to understand and manipulate differential forms. A knowledge of de Rham cohomology is required for the last third of the text. Prerequisite material is contained in author's text An Introduction to Manifolds, and can be learned in one semester. For the benefit of the reader and to establish common notations, Appendix A recalls the basics of manifold theory. Additionally, in an attempt to make the exposition more self-contained, sections on algebraic constructions such as the tensor product and the exterior power are included. Differential geometry, as its name implies, is the study of geometry using differential calculus. It dates back to Newton and Leibniz in the seventeenth century, but it was not until the nineteenth century, with the work of Gauss on surfaces and Riemann on the curvature tensor, that differential geometry flourished and its modern foundation was laid. Over the past one hundred years, differential geometry has proven indispensable to an understanding of the physical world, in Einstein's general theory of relativity, in the theory of gravitation, in gauge theory, and now in string theory. Differential geometry is also useful in topology, several complex variables, algebraic geometry, complex manifolds, and dynamical systems, among other fields. The field has even found applications to group theory as in Gromov's work and to probability theory as in Diaconis's work. It is not too far-fetched to argue that differential geometry should be in every mathematician's arsenal.
This updated and revised first-course textbook in applied probability provides a contemporary

and lively post-calculus introduction to the subject of probability. The exposition reflects a desirable balance between fundamental theory and many applications involving a broad range of real problem scenarios. It is intended to appeal to a wide audience, including mathematics and statistics majors, prospective engineers and scientists, and those business and social science majors interested in the quantitative aspects of their disciplines. The textbook contains enough material for a year-long course, though many instructors will use it for a single term (one semester or one quarter). As such, three course syllabi with expanded course outlines are now available for download on the book's page on the Springer website. A one-term course would cover material in the core chapters (1-4), supplemented by selections from one or more of the remaining chapters on statistical inference (Ch. 5), Markov chains (Ch. 6), stochastic processes (Ch. 7), and signal processing (Ch. 8—available exclusively online and specifically designed for electrical and computer engineers, making the book suitable for a one-term class on random signals and noise). For a year-long course, core chapters (1-4) are accessible to those who have taken a year of univariate differential and integral calculus; matrix algebra, multivariate calculus, and engineering mathematics are needed for the latter, more advanced chapters. At the heart of the textbook's pedagogy are 1,100 applied exercises, ranging from straightforward to reasonably challenging, roughly 700 exercises in the first four "core" chapters alone—a self-contained textbook of problems introducing basic theoretical knowledge necessary for solving problems and illustrating how to solve the problems at hand – in R and MATLAB, including code so that students can create simulations. New to this edition • Updated and re-worked Recommended Coverage for instructors, detailing which courses should use the textbook and how to utilize different sections for various objectives and time constraints • Extended and revised instructions and solutions to problem sets • Overhaul of Section 7.7 on continuous-time Markov chains • Supplementary materials include three sample syllabi and updated solutions manuals for both instructors and students

Intended as the text for a sequence of advanced courses, this book covers major topics in theoretical statistics in a concise and rigorous fashion. The discussion assumes a background in advanced calculus, linear algebra, probability, and some analysis and topology. Measure theory is used, but the notation and basic results needed are presented in an initial chapter on probability, so prior knowledge of these topics is not essential. The presentation is designed to expose students to as many of the central ideas and topics in the discipline as possible, balancing various approaches to inference as well as exact, numerical, and large sample methods. Moving beyond more standard material, the book includes chapters introducing bootstrap methods, nonparametric regression, equivariant estimation, empirical Bayes, and sequential design and analysis. The book has a rich collection of exercises. Several of them illustrate how the theory developed in the book may be used in various applications. Solutions to many of the exercises are included in an appendix.

The latest authors, like the most ancient, strove to subordinate the phenomena of nature to the laws of mathematics Isaac Newton, 1647–1727 The approach quoted above has been adopted and practiced by many teachers of chemistry. Today, physical chemistry textbooks are written for science and engineering majors who possess an interest in and aptitude for mathematics.No knowledge of chemistry or biology (not to mention poetry) is required. To me this sounds like a well-de?ned prescription for limiting the readership to a few and carefully selected. I think the importance of physical chemistry goes beyond this precept. The s- ject should bene?t both the science and engineering majors and those of us who dare to ask questions about the world around us. Numerical mathematics, or a way of thinking in mathematical formulas and numbers – which we all practice, when paying in cash or doing our tax forms – is important but should not be used to subordinate the in?nitely rich world of physical chemistry.

This book features challenging problems of classical analysis that invite the reader to explore a host of strategies and tools used for solving problems of modern topics in real analysis. This volume offers an unusual collection of problems — many of them original — specializing in three topics of mathematical analysis: limits, series, and fractional part integrals. The work is divided into three parts, each containing a chapter dealing with a particular problem type as well as a very short section of hints to select problems. The first chapter collects problems on limits of special sequences and Riemann integrals; the second chapter focuses on the calculation of fractional part integrals with a special section called 'Quickies' which contains problems that have had unexpected succinct solutions. The final chapter offers the reader an assortment of problems with a flavor towards the computational aspects of infinite series and special products, many of which are new to the literature. Each chapter contains a section of difficult problems which are motivated by other problems in the book. These 'Open Problems' may be considered research projects for students who are studying advanced calculus, and which are intended to stimulate creativity and the discovery of new and original methods for proving known results and establishing new ones. This stimulating collection of problems is intended for undergraduate students with a strong background in analysis; graduate students in mathematics, physics, and engineering; researchers; and anyone who works on topics at the crossroad between pure and applied mathematics. Moreover, the level of problems is appropriate for students involved in the Putnam competition and other high level mathematical contests.