Fundamentals Of Mathematical Analysis By Rod Haggarty

Real analysis is difficult. For most students, in addition to learning new material about real numbers, topology, and sequences, they are also learning to read and write rigorous proofs for the first time. The Real Analysis Lifesaver is an innovative guide that helps students through their first real analysis course while giving them the solid foundation they need for further study in proof-based math. Rather than presenting polished proofs with no explanation of how they were devised, The Real Analysis Lifesaver takes a two-step approach, first showing students how to work backwards to solve the crux of the problem, then showing them how to write it up formally. It takes the time to provide plenty of examples as well as guided "fill in the blanks" exercises to solidify understanding. Newcomers to real analysis can feel like they are drowning in new symbols, concepts, and an entirely new way of thinking about math. Inspired by the popular Calculus Lifesaver, this book is refreshingly straightforward and full of clear explanations, pictures, and humor. It is the lifesaver that every drowning student needs. The essential “lifesaver” companion for any course in real analysis Clear, humorous, and easy-to-read style Teaches students not just what the proofs are, but how to do them—in more than 40 worked-out examples Every new definition is accompanied by examples and important clarifications Features more than 20 “fill in the blanks” exercises to help internalize proof techniques Tried and tested in the classroom

This book provides an introduction to basic topics in Real Analysis and makes the subject easily understandable to all learners. The book is useful for those that are involved with Real Analysis in disciplines such as mathematics, engineering, technology, and other physical sciences. It provides a good balance while dealing with the basic and essential topics that enable the reader to learn the more advanced topics easily. It includes many examples and end of chapter exercises including hints for solutions in several critical cases. The book is ideal for students, instructors, as well as those doing research in areas requiring a basic knowledge of Real Analysis. Those more advanced in the field will also find the book useful to refresh their knowledge of the topic. Features Includes basic and essential topics of real analysis Adopts a reasonable approach to make the subject easier to learn Contains many solved examples and exercise at the end of each chapter Presents a quick review of the fundamentals of set theory Covers the real number system Discusses the basic concepts of metric spaces and complete metric spaces

Providing students with an introduction to the fundamentals of analysis, this book continues to present the fundamental concepts of analysis in as painless a manner as possible. To achieve this aim, the second edition has made many improvements in exposition.

Was plane geometry your favourite math course in high school? Did you like proving theorems? Are you sick of memorising integrals? If so, real analysis could be your cup of tea. In contrast to calculus and elementary algebra, it involves neither formula manipulation nor applications to other fields of science. None. It is Pure Mathematics, and it is sure to appeal to the budding pure mathematician. In this new introduction to undergraduate real analysis the author takes a different approach from past studies of the subject, by stressing the importance of pictures in mathematics and hard problems. The exposition is informal and relaxed, with many helpful asides, examples and occasional comments from mathematicians like Dieudonne, Littlewood and Osserman. The author has taught the subject many times over the last 35 years at Berkeley and this book is based on the honours version of this course. The book contains an excellent selection of more than 500 exercises.

Natural numbers, zero, negative integers, rational numbers, irrational numbers, real numbers, complex numbers, . . ., and, what are numbers? The most accurate mathematical answer to the question is given in this book.

This book provides a transition from the formula-full aspects of the beginning study of college level mathematics to the rich and creative world of more advanced topics. It is designed to assist the student in mastering the techniques of analysis and proof that are required to do mathematics. Along with the standard material such as linear algebra, construction of the real numbers via Cauchy sequences, metric spaces and complete metric spaces, there are three projects at the end of each chapter that form an integral part of the text. These projects include a detailed discussion of topics such as group theory, convergence of infinite series, decimal expansions of real numbers, point set topology and topological groups. They are carefully designed to guide the student through the subject matter. Together with numerous exercises included in the book, these projects may be used as part of the regular classroom presentation, as self-study projects for students, or for Inquiry Based Learning activities presented by the students.

This book provides the essential foundations of both linear and nonlinear analysis necessary for understanding and working in twenty-first century applied and computational mathematics. In addition to the standard topics, this text includes several key concepts of modern applied mathematical analysis that should be, but are not typically, included in advanced undergraduate and beginning graduate mathematics curricula. This material is the introductory foundation upon which algorithm analysis, optimization, probability, statistics, differential equations, machine learning, and control theory are built. When used in concert with the free supplemental lab materials, this text teaches students both the theory and the computational practice of modern mathematical analysis. Foundations of Applied Mathematics, Volume 1: Mathematical Analysis?includes several key topics not usually treated in courses at this level, such as uniform contraction mappings, the continuous linear extension theorem, Daniell?Lebesgue integration, resolvents, spectral resolution theory, and pseudospectra. Ideas are developed in a mathematically rigorous way and students are provided with powerful tools and beautiful ideas that yield a number of nice proofs, all of which contribute to a deep understanding of advanced analysis and linear algebra. Carefully thought out exercises and examples are built on each other to reinforce and retain concepts and ideas and to achieve greater depth. Associated lab materials are available that expose students to applications and numerical computation and reinforce the theoretical ideas taught in the text. The text and labs combine to make students technically proficient and to answer the age-old question, "When am I going to use this?

The new, Third Edition of this successful text covers the basic theory of integration in a clear, well-organized manner. The authors present an imaginative and highly practical synthesis of the "Daniell method" and the measure theoretic approach. It is the ideal text for undergraduate and first-year graduate courses in real analysis. This edition offers a new chapter on Hilbert Spaces and integrates over 150 new exercises. New and varied examples are included for each chapter. Students will be challenged by the more than 600 exercises. Topics are treated rigorously, illustrated by examples, and offer a clear connection between real and functional analysis. This text can be used in combination with the authors' Problems in Real Analysis, 2nd Edition, also published by Academic Press, which offers complete solutions to all exercises in the Principles text. Key Features: * Gives a unique presentation of integration theory * Over 150 new exercises integrated throughout the text * Presents a new chapter on Hilbert Spaces * Provides a rigorous introduction to measure theory * Illustrated with new and varied examples in each chapter * Introduces topological ideas in a friendly manner * Offers a clear connection between real analysis and functional analysis * Includes brief biographies of mathematicians "All in all, this is a beautiful selection and a masterfully balanced presentation of the fundamentals of contemporary measure and integration theory which can be grasped easily by the student." --J. Lorenz in Zentralblatt für Mathematik "...a clear and precise treatment of the subject. There are many exercises of varying degrees of difficulty. I highly recommend this book for classroom use." --CASPAR GOFFMAN, Department of Mathematics, Purdue University

Among the traditional purposes of such an introductory course is the training of a student in the conventions of pure mathematics: acquiring a feeling for what is considered a proof, and supplying literate written arguments to support mathematical propositions. To this extent, more than one proof is included for a theorem - where this is considered beneficial - so as to stimulate the students' reasoning for alternate approaches and ideas. The second half of this book, and consequently the second semester, covers differentiation and integration, as well as the connection between these concepts, as displayed in the general theorem of Stokes. Also included are some beautiful applications of this theory, such as Brouwer's fixed point theorem, and the Dirichlet principle for harmonic functions. Throughout, reference is made to earlier sections, so as to reinforce the main ideas by repetition. Unique in its applications to some topics not usually covered at this level.

The fundamental mathematical tools needed to understand machine learning include linear algebra, analytic geometry, matrix decompositions, vector calculus, optimization, probability and statistics. These topics are traditionally taught in disparate courses, making it hard for data science or computer science students, or professionals, to efficiently learn the mathematics. This self-contained textbook bridges the gap between mathematical and machine learning texts, introducing the mathematical concepts with a minimum of prerequisites. It uses these concepts to derive four central machine learning methods: linear regression, principal component analysis, Gaussian mixture models and support vector machines. For students and others with a mathematical background, these derivations provide a starting point to machine learning texts. For those learning the mathematics for the first time, the methods help build intuition and practical experience with applying mathematical concepts. Every chapter includes worked examples and exercises to test understanding. Programming tutorials are offered on the book's web site.

Volume II of a unique survey of the whole field of pure mathematics.

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

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

Mathematical analysis is fundamental to the undergraduate curriculum not only because it is the stepping stone for the study of advanced analysis, but also because of its applications to other branches of mathematics, physics, and engineering at both the undergraduate and graduate levels. This self-contained textbook consists of eleven chapters, which are further divided into sections and subsections. Each section includes a careful selection of special topics covered that will serve to illustrate the scope and power of various methods in real analysis. The exposition is developed with thorough explanations, motivating examples, exercises, and illustrations conveying geometric intuition in a pleasant and informal style to help readers grasp difficult concepts. Foundations of Mathematical Analysis is intended for undergraduate students and beginning graduate students interested in a fundamental introduction to the subject. It may be used in the classroom or as a self-study guide without any required prerequisites.

The author’s goal is a rigorous presentation of the fundamentals of analysis, starting from elementary level and moving to the advanced coursework. The curriculum of all mathematics (pure or applied) and physics programs include a compulsory course in mathematical analysis. This book will serve as can serve a main textbook of such (one semester) courses. The book can also serve as additional reading for such courses as real analysis, functional analysis, harmonic analysis etc. For non-math major students requiring math beyond calculus, this is a more friendly approach than many math-centric options. Friendly and well-rounded presentation of pre-analysis topics such as sets, proof techniques and systems of numbers. Deeper discussion of the basic concept of convergence for the system of real numbers, pointing out its specific features, and for metric spaces Presentation of Riemann integration and its place in the whole integration theory for single variable, including the Kurzweil-Henstock integration Elements of multiplicative calculus aiming to demonstrate the non-absoluteness of Newtonian calculus.

Education is an admirable thing, but it is well to remember from time to time that nothing worth knowing can be taught. Oscar Wilde, “The Critic as Artist,” 1890. Analysis is a profound subject; it is neither easy to understand nor summarize. However, Real Analysis can be discovered by solving problems. This book aims to give independent students the opportunity to discover Real Analysis by themselves through problem solving.

ThedepthandcomplexityofthetheoryofAnalysiscanbeappreciatedbytakingaglimpseatits developmental history. Although

Analysis was conceived in the 17th century during the Scienti?c Revolution, it has taken nearly two hundred years to establish its theoretical basis. Kepler, Galileo, Descartes, Fermat, Newton and Leibniz were among those who contributed to its genesis. Deep conceptual changes in Analysis were brought about in the 19th century by Cauchy and Weierstrass. Furthermore, modern concepts such as open and closed sets were introduced in the 1900s. Today nearly every undergraduate mathematics program requires at least one semester of Real Analysis. Often, students consider this course to be the most challenging or even intimidating of all their mathematics major requirements. The primary goal of this book is to alleviate those concerns by systematically solving the problems related to the core concepts of most analysis courses. In doing so, we hope that learning analysis becomes less taxing and thereby more satisfying.

TO THE FIRST RUSSIAN EDITION It was a very difficult task to write a guide-book of a small size designed to contain the fundamental knowledge of mathema tics which is most necessary to engineers and students of higher technical schools. In our tendency to the compactness and brevity of the exposition, we attempted, however, to produce a guide-book which would be easy to understand, convenient to use and as accurate as possible (as much as it is required in engineering). It should be pointed out that this book is neither a handbook nor a compendium, but a guide-book. Therefore it is not written as systematically as a handbook should be written. Hence the reader should not be surprised to find, for example, I'HOpital's rule in the section devoted to computation of limits which is a part of the chapter "Introduction to the analysis" placed before the concept of the derivative, or information about the Gamma function in the chapter "Algebra"-just after the concept of the factorial. There are many such "imperfections" in the book. Thus a reader who wants to acquire certain information is advised to use not only the table of contents but also the alpha betical index inserted at the end of the book. If a problem mentioned in the text is explained in detail in another place of the book, then the corresponding page is indicated in a footnote.

This classic is an ideal introduction for students into the methodology and thinking of higher mathematics. It covers material not usually taught in the more technically-oriented introductory classes and will give students a well-rounded foundation for future studies.

The three volumes of A Course in Mathematical Analysis provide a full and detailed account of all those elements of real and complex analysis that an undergraduate mathematics student can expect to encounter in their first two or three years of study. Containing hundreds of exercises, examples and applications, these books will become an invaluable resource for both students and instructors. This first volume focuses on the analysis of real-valued functions of a real variable. Besides developing the basic theory it describes many applications, including a chapter on Fourier series. It also includes a Prologue in which the author introduces the axioms of set theory and uses them to construct the real number system. Volume 2 goes on to consider metric and topological spaces and functions of several variables. Volume 3 covers complex analysis and the theory of measure and integration.

The Fundamentals of Mathematical Analysis, Volume 1 is a textbook that provides a systematic and rigorous treatment of the fundamentals of mathematical analysis. Emphasis is placed on the concept of limit which plays a principal role in mathematical analysis. Examples of the application of mathematical analysis to geometry, mechanics, physics, and engineering are given. This volume is comprised of 14 chapters and begins with a discussion on real numbers, their properties and applications, and arithmetical operations over real numbers. The reader is then introduced to the concept of function, important classes of functions, and functions of one variable; the theory of limits and the limit of a function, monotonic functions, and the principle of convergence; and continuous functions of one variable. A systematic account of the differential and integral calculus is then presented, paying particular attention to differentiation of functions of one variable; investigation of the behavior of functions by means of derivatives; functions of several variables; and differentiation of functions of several variables. The remaining chapters focus on the concept of a primitive function (and of an indefinite integral); definite integral; geometric applications of integral and differential calculus. This book is intended for first- and second-year mathematics students.

Fundamentals of Mathematical Analysis explores real and functional analysis with a substantial component on topology. The three leading chapters furnish background information on the real and complex number fields, a concise introduction to set theory, and a rigorous treatment of vector spaces. Fundamentals of Mathematical Analysis is an extensive study of metric spaces, including the core topics of completeness, compactness and function spaces, with a good number of applications. The later chapters consist of an introduction to general topology, a classical treatment of Banach and Hilbert spaces, the elements of operator theory, and a deep account of measure and integration theories. Several courses can be based on the book. This book is suitable for a two-semester course on analysis, and material can be chosen to design one-semester courses on topology or real analysis. It is designed as an accessible classical introduction to the subject and aims to achieve excellent breadth and depth and contains an abundance of examples and exercises. The topics are carefully sequenced, the proofs are detailed, and the writing style is clear and concise. The only prerequisites assumed are a thorough understanding of undergraduate real analysis and linear algebra, and a degree of mathematical maturity.

Mathematical and Physical Fundamentals of Climate Change is the first book to provide an overview of the math and physics necessary for scientists to understand and apply atmospheric and oceanic models to climate research. The book begins with basic mathematics then leads on to specific applications in atmospheric and ocean dynamics, such as fluid dynamics, atmospheric dynamics, oceanic dynamics, and glaciers and sea level rise. Mathematical and Physical Fundamentals of Climate Change provides a solid foundation in math and physics with which to understand global warming, natural climate variations, and climate models. This book informs the future users of climate models and the decision-makers of tomorrow by providing the depth they need. Developed from a course that the authors teach at Beijing Normal University, the material has been extensively class-tested and contains online resources, such as presentation files, lecture notes, solutions to problems and MATLab codes. Includes MatLab and Fortran programs that allow readers to create their own models Provides case studies to show how the math is applied to climate research Online resources include presentation files, lecture notes, and solutions to problems in book for use in classroom or self-study

The aim of this book is to help students write mathematics better. Throughout it are large exercise sets well-integrated with the text and varying appropriately from easy to hard. Basic issues are treated, and attention is given to small issues like not placing a mathematical symbol directly after a punctuation mark. And it provides many examples of what students should think and what they should write and how these two are often not the same.

The ideas and methods of mathematics, long central to the physical sciences, now play an increasingly important role in a wide variety of disciplines. Analysis provides theorems that prove that results are true and provides techniques to estimate the errors in approximate calculations. The ideas and methods of analysis play a fundamental role in ordinary differential equations, probability theory, differential geometry, numerical analysis, complex analysis, partial differential equations, as well as in most areas of applied mathematics.

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.

"The three volumes of A Course in Mathematical Analysis provide a full and detailed account of all those elements of real and complex analysis that an undergraduate mathematics student can expect to encounter in their first two or three years of study. Containing hundreds of exercises, examples and applications, these books will become an invaluable resource for both students and instructors. Volume I focuses on the analysis of real-valued functions of a real variable. Besides developing the basic theoryit describes many applications, including a chapter on Fourier series. It also includes a Prologue in which the author introduces the axioms of set theory and uses them to construct the real number system. Volume II goes on to consider metric and topological spaces, and functions of several variables. Volume III covers complex analysis and the theory of measure and integration"--

This definitive look at modern analysis includes applications to statistics, numerical analysis, Fourier series, differential equations, mathematical analysis, and functional analysis. The self-contained treatment contains clear explanations and all the appropriate theorems and proofs. A selection of more than 750 exercises includes some hints and solutions. 1981 edition.

Bayesian analyses go beyond frequentist techniques of p-values and null hypothesis tests, providing a modern understanding of data analysis.

Using an extremely clear and informal approach, this book introduces readers to a rigorous understanding of mathematical analysis and presents challenging math concepts as clearly as possible. The real number system. Differential calculus of functions of one variable. Riemann integral functions of one variable. Integral calculus of real-valued functions. Metric Spaces. For those who want to gain an understanding of mathematical analysis and challenging mathematical concepts.

"This book is very well organized and clearly written and contains an adequate supply of exercises. If one is comfortable with the choice of topics in the book, it would be a good candidate for a text in a graduate real analysis course." -- MATHEMATICAL REVIEWS

This precis, comprised of three volumes, of which this book is the first, exposes the mathematical elements which make up the foundations of a number of contemporary scientific methods: modern theory on systems, physics and engineering. This first volume focuses primarily on algebraic questions: categories and functors, groups, rings, modules and algebra. Notions are introduced in a general framework and then studied in the context of commutative and homological algebra; their application in algebraic topology and geometry is therefore developed. These notions play an essential role in algebraic analysis (analytico-algebraic systems theory of ordinary or partial linear differential equations). The book concludes with a study of modules over the main types of rings, the rational canonical form of matrices, the (commutative) theory of elemental divisors and their application in systems of linear differential equations with constant coefficients. Part of the New Mathematical Methods, Systems, and Applications series Presents the notions, results, and proofs necessary to understand and master the various topics Provides a unified notation, making the task easier for the reader. Includes several summaries of mathematics for engineers

Knowledge updating is a never-ending process and so should be the revision of an effective textbook. The book originally written fifty years ago has, during the intervening period, been revised and reprinted several times. The authors have, however, been thinking, for the last few years that the book needed not only a thorough revision but rather a substantial rewriting. They now take great pleasure in presenting to the readers the twelfth, thoroughly revised and enlarged, Golden Jubilee edition of the book. The subject-matter in the entire book has been re-written in the light of numerous criticisms and suggestions received from the users of the earlier editions in India and abroad. The basis of this revision has been the emergence of new literature on the subject, the constructive feedback from students and teaching fraternity, as well as those changes that have been made in the syllabi and/or the pattern of examination papers of numerous universities. Knowledge updating is a never-ending process and so should be the revision of an effective textbook. The book originally written fifty years ago has, during the intervening period, been revised and reprinted several times. The authors have, however, been thinking, for the last few years that the book needed not only a thorough revision but rather a substantial rewriting. They now take great pleasure in presenting to the readers the twelfth, thoroughly revised and enlarged, Golden Jubilee edition of the book. The subject-matter in the entire book has been re-written in the light of numerous criticisms and suggestions received from the users of the earlier editions in India and abroad. The basis of this revision has been the emergence of new literature on the subject, the constructive feedback from students and teaching fraternity, as well

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This is a textbook for a course in Honors Analysis (for freshman/sophomore undergraduates) or Real Analysis (for junior/senior undergraduates) or Analysis-I (beginning graduates). It is intended for students who completed a course in ``AP Calculus'', possibly followed by a routine course in multivariable calculus and a computational course in linear algebra. There are three features that distinguish this book from many other books of a similar nature and which are important for the use of this book as a text. The first, and most important, feature is the collection of exercises. These are spread throughout the chapters and should be regarded as an essential component of the student's learning. Some of these exercises comprise a routine follow-up to the material, while others challenge the student's understanding more deeply. The second feature is the set of independent projects presented at the end of each chapter. These projects supplement the content studied in their respective chapters. They can be used to expand the student's knowledge and understanding or as an opportunity to conduct a seminar in Inquiry Based Learning in which the students present the material to their class. The third really important feature is a series of challenge problems that increase in impossibility as the chapters progress.

This textbook offers a comprehensive undergraduate course in real analysis in one variable. Taking the view that analysis can only be properly appreciated as a rigorous theory, the book recognises the difficulties that students experience when encountering this theory for the first time, carefully addressing them throughout. Historically, it was the precise description of real numbers and the correct definition of limit that placed analysis on a solid foundation. The book therefore begins with these crucial ideas and the fundamental notion of sequence. Infinite series are then introduced, followed by the key concept of continuity. These lay the groundwork for differential and integral calculus, which are carefully covered in the following chapters. Pointers for further study are included throughout the book, and for the more adventurous there is a selection of "nuggets", exciting topics not commonly discussed at this level. Examples of nuggets include Newton's method, the irrationality of ?, Bernoulli numbers, and the Gamma function. Based on decades of teaching experience, this book is written with the undergraduate student in mind. A large number of exercises, many with hints, provide the practice necessary for learning, while the included "nuggets" provide opportunities to deepen understanding and broaden horizons.

Measure and integration, metric spaces, the elements of functional analysis in Banach spaces, and spectral theory in Hilbert spaces — all in a single study. Only book of its kind. Unusual topics, detailed analyses. Problems. Excellent for first-year graduate students, almost any course on modern analysis. Preface. Bibliography. Index.

to the English Translation This is a concise guide to basic sections of modern functional analysis. Included are such topics as the principles of Banach and Hilbert spaces, the theory of multinormed and uniform spaces, the Riesz-Dunford holomorphic functional calculus, the Fredholm index theory, convex analysis and duality theory for locally convex spaces. With standard provisos the presentation is self-contained, exposing about a h- dred famous "named" theorems furnished with complete proofs and culminating in the Gelfand-Nalmark-Segal construction for C*-algebras. The first Russian edition was printed by the Siberian Division of "Nauka" P- lishers in 1983. Since then the monograph has served as the standard textbook on functional analysis at the University of Novosibirsk. This volume is translated from the second Russian edition printed by the Sobolev Institute of Mathematics of the Siberian Division of the Russian Academy of Sciences· in 1995. It incorporates new sections on Radon measures, the Schwartz spaces of distributions, and a supplementary list of theoretical exercises and problems. This edition was typeset using AMS-'lEX, the American Mathematical Society's 'lEX system. To clear my conscience completely, I also confess that := stands for the definor, the assignment operator, signifies the end of the proof.

Fundamentals of Mathematical AnalysisAddison-Wesley Longman

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 I.) 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 volume provides an introduction to modern concepts of linear and nonlinear functional analysis. Its purpose is also to provide an insight into the variety of deeply interlaced mathematical tools applied in the study of nonlinear problems.