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A Topological Introduction to Nonlinear Analysis-Robert F. Brown 2014-11-27 This third edition is addressed to the mathematician or graduate student of mathematics - or even the well-prepared undergraduate - who would like, with a minimum of background and preparation, to understand some of the beautiful results at the heart of nonlinear analysis. Based on carefully-expounded ideas from several branches of topology, and illustrated by a wealth of figures that attest to the geometric nature of the exposition, the book will be of immense help in providing its readers with an understanding of the mathematics of the nonlinear phenomena that characterize our real world. Included in this new edition are several new chapters that present the fixed point index and its applications. The exposition and mathematical content is improved throughout. This book is ideal for self-study for mathematicians and students interested in such areas of geometric and algebraic topology, functional analysis, differential equations, and applied mathematics. It is a sharply focused and highly readable view of nonlinear analysis by a practicing topologist who has seen a clear path to understanding. "For the topology-minded reader, the book indeed has a lot to offer: written in a very personal, eloquent and instructive style it makes one of the highlights of nonlinear analysis accessible to a wide audience."-Monatshefte fur Mathematik (2006)
An Introduction to Nonlinear Analysis: Theory-Zdzisław Denkowski 2003
An Introduction to Nonlinear Analysis and Fixed Point Theory-Hemant Kumar Pathak 2018-05-19 This book systematically introduces the theory of nonlinear analysis, providing an overview of topics such as geometry of Banach spaces, differential calculus in Banach spaces, monotone operators, and fixed point theorems. It also discusses degree theory, nonlinear matrix equations, control theory, differential and integral equations, and inclusions. The book presents surjectivity theorems, variational inequalities, stochastic game theory and mathematical biology, along with a large number of applications of these theories in various other disciplines. Nonlinear analysis is characterised by its applications in numerous interdisciplinary fields, ranging from engineering to space science, hydromechanics to astrophysics, chemistry to biology, theoretical mechanics to biomechanics and economics to stochastic game theory. Organised into ten chapters, the book shows the elegance of the subject and its deep-rooted concepts and techniques, which provide the tools for developing more realistic and accurate models for a variety of phenomena encountered in diverse applied fields. It is intended for graduate and undergraduate students of mathematics and engineering who are familiar with discrete mathematical structures, differential and integral equations, operator theory, measure theory, Banach and Hilbert spaces, locally convex topological vector spaces, and linear functional analysis.
An Introduction to Nonlinear Functional Analysis and Elliptic Problems-Antonio Ambrosetti 2011-07-19 This self-contained textbook provides the basic, abstract tools used in nonlinear analysis and their applications to semilinear

elliptic boundary value problems and displays how various approaches can easily be applied to a range of model cases. Complete with a preliminary chapter, an appendix that includes further results on weak derivatives, and chapter-by-chapter exercises, this book is a practical text for an introductory course or seminar on nonlinear functional analysis.

Introduction to Nonlinear Physics-Lui Lam 2003-11-14 This textbook provides an introduction to the new science of nonlinear physics for advanced undergraduates, beginning graduate students, and researchers entering the field. The chapters, by pioneers and experts in the field, share a unified perspective. Nonlinear science developed out of the increasing ability to investigate and analyze systems for which effects are not simply linear functions of their causes; it is associated with such well-known code words as chaos, fractals, pattern formation, solitons, cellular automata, and complex systems. Nonlinear phenomena are important in many fields, including dynamical systems, fluid dynamics, materials science, statistical physics, and paritcel physics. The general principles developed in this text are applicable in a wide variety of fields in the natural and social sciences. The book will thus be of interest not only to physicists, but also to engineers, chemists, geologists, biologists, economists, and others interested in nonlinear phenomena. Examples and exercises complement the text, and extensive references provide a guide to research in the field.

Fundamental Concepts in Modern Analysis: an Introduction to Nonlinear Analysis (Second Edition)-Vagn Lundsgaard Hansen 2019-11-07 "The book starts from the basic notions of continuity and gradually builds up the theory of topological spaces, so that the reader goes from the intuitive notions to the abstract notions with as little pain as possible Similarly, differentiability is gradually built up from the intuitive to the abstract notions. Full proofs are given for the Chain Rule and the Inverse Function Theorem in Banach spaces Few books fill the gap from mathematical modeling based on elementary topology and calculus in finite dimensional real number spaces, to contemporary mathematics where advanced methods from topology and analysis pave the way for application of new strong tools such as manifolds and infinite dimensional function spaces. The present book attempts to fill this gap"--

Topological Nonlinear Analysis-Michele Matzeu 2012-12-06 Topological tools in Nonlinear Analysis had a tremendous develop ment during the last few decades. The three main streams of research in this field, Topological Degree, Singularity Theory and Variational Meth ods, have lately become impetuous rivers of scientific investigation. The process is still going on and the achievements in this area are spectacular. A most promising and rapidly developing field of research is the study of the role that symmetries play in nonlinear problems. Symmetries appear in a quite natural way in many problems in physics and in differential or symplectic geometry, such as closed orbits for autonomous Hamiltonian systems, configurations of symmetric elastic plates under pressure, Hopf Bifurcation, Taylor vortices, convective motions of fluids, oscillations of chemical reactions, etc . . . Some of these problems have been tackled recently by different techniques using equivariant versions of Degree, Singularity and Variations. The main purpose of the present volume is to give a survey of some of the most significant achievements obtained by topological methods in Nonlinear Analysis during the last two-three decades. The survey articles presented here reflect the personal taste and points of view of the authors (all of them well-known and distinguished specialists in their own fields) on the subject matter. A common feature of these papers is that of start ing with an historical introductory background of the different disciplines under consideration and climbing up to the heights of the most recent re sults.

Introduction to Nonlinear Differential and Integral Equations-Harold Thayer Davis 1962-01-01 Topics covered include differential equations of the 1st order, the Riccati equation and existence theorems, 2nd order equations, elliptic integrals and functions, nonlinear mechanics, nonlinear integral equations, more. Includes 137 problems.

Applied Nonlinear Functional Analysis-Nikolaos S. Papageorgiou 2018-08-06 The aim of this book is to provide a concise but complete introduction to the main mathematical tools of nonlinear functional analysis, which are also used in the study of concrete problems in economics, engineering, and physics. This volume gathers the mathematical background needed in order to conduct research or to deal with theoretical problems and applications using the tools of nonlinear functional analysis.

Handbook of Topological Fixed Point Theory-Robert F. Brown 2005-12-05 This book is the first in the world literature presenting all new trends

in topological fixed point theory. Until now all books connected to the topological fixed point theory were devoted only to some parts of this theory. This book will be especially useful for post-graduate students and researchers interested in the fixed point theory, particularly in topological methods in nonlinear analysis, differential equations and dynamical systems. The content is also likely to stimulate the interest of mathematical economists, population dynamics experts as well as theoretical physicists exploring the topological dynamics.
An Introduction to Nonlinear Analysis-Martin Schechter 2004 The techniques that can be used to solve non-linear problems are far different than those that are used to solve linear problems. Many courses in analysis and applied mathematics attack linear cases simply because they are easier to solve and do not require a large theoretical background in order to approach them. Professor Schechter's 2005 book is devoted to non-linear methods using the least background material possible and the simplest linear techniques. An understanding of the tools for solving non-linear problems is developed whilst demonstrating their application to problems in one dimension and then leading to higher dimensions. The reader is guided using simple exposition and proof, assuming a minimal set of pre-requisites. For completion, a set of appendices covering essential basics in functional analysis and metric spaces is included, making this ideal as an accompanying text on an upper-undergraduate or graduate course, or even for self-study.
Topological Degree Methods in Nonlinear Boundary Value Problems-J. Mawhin 1979 This volume contains expository lectures from the CBMS Regional Conference held at Harvey Mudd College, June 1977. The conference was supported by the National Science Foundation. The main theme of this monograph consists of applications to nonlinear differential equations of the author's coincidental degree. It includes an extensive bibliography covering many aspects of the modern theory of nonlinear differential equations and the theory of nonlinear analysis.
An Introduction to Nonlinear Analysis: Applications-Zdzislaw Denkowski 2003
Topics in Nonlinear Functional Analysis-L. Nirenberg 2001 Since its first appearance as a set of lecture notes published by the Courant Institute in 1974, this book has served as an introduction to various subjects in nonlinear functional analysis. The current edition is a reprint of these notes, with added bibliographic references. Topological and analytic methods are developed for treating nonlinear ordinary and partial differential equations. The first two chapters of the book introduce the notion of topological degree and develop its basic properties. These properties are used in later chapters in the discussion of bifurcation theory (the possible branching of solutions as parameters vary), including the proof of Rabinowitz's global bifurcation theorem. Stability of the branches is also studied. The book concludes with a presentation of some generalized implicit function theorems of Nash-Moser type with applications to Kolmogorov-Arnold-Moser theory and to conjugacy problems. After more than 20 years, this book continues to be an excellent graduate level textbook and a useful supplementary course text.
Introduction to Nonlinear Science-G. Nicolis 1995-06-22 . This book will be of great value to graduate students in physics, applied mathematics, chemistry, engineering and biology taking courses in nonlinear science and its applications, as well as to researchers and teachers involved in one way or another in this field.
Topological and Variational Methods with Applications to Nonlinear Boundary Value Problems-Dumitru Motreanu 2013-11-19 This book focuses on nonlinear boundary value problems and the aspects of nonlinear analysis which are necessary to their study. The authors first give a comprehensive introduction to the many different classical methods from nonlinear analysis, variational principles, and Morse theory. They then provide a rigorous and detailed treatment of the relevant areas of nonlinear analysis with new applications to nonlinear boundary value problems for both ordinary and partial differential equations. Recent results on the existence and multiplicity of critical points for both smooth and nonsmooth functional, developments on the degree theory of monotone type operators, nonlinear maximum and comparison principles for p-Laplacian type operators, and new developments on nonlinear Neumann problems involving non-homogeneous differential operators appear for the first time in book form. The presentation is systematic, and an extensive bibliography and a remarks section at the end of each chapter highlight the text. This work will serve as an invaluable reference for researchers working in nonlinear analysis and partial differential equations as well as a useful tool for all those interested in the topics presented.

An Introduction to Nonlinear Boundary Value Problems-Lakshmikantham 1974-05-31 A book on an advanced level that exposes the reader to the fascinating field of differential equations and provides a ready access to an up-to-date state of this art is of immense value. This book presents a variety of techniques that are employed in the theory of nonlinear boundary value problems. For example, the following are discussed: methods that involve differential inequalities; shooting and angular function techniques; functional analytic approaches; topological methods.

Nonlinear Analysis-Leszek Gasinski 2005-07-27 Nonlinear analysis is a broad, interdisciplinary field characterized by a remarkable mixture of analysis, topology, and applications. Its concepts and techniques provide the tools for developing more realistic and accurate models for a variety of phenomena encountered in fields ranging from engineering and chemistry to economics and biology. This volume focuses on topics in nonlinear analysis pertinent to the theory of boundary value problems and their application in areas such as control theory and the calculus of variations. It complements the many other books on nonlinear analysis by addressing topics previously discussed fully only in scattered research papers. These include recent results on critical point theory, nonlinear differential operators, and related regularity and comparison principles. The rich variety of topics, both theoretical and applied, make Nonlinear Analysis useful to anyone, whether graduate student or researcher, working in analysis or its applications in optimal control, theoretical mechanics, or dynamical systems. An appendix contains all of the background material needed, and a detailed bibliography forms a guide for further study.

Introduction to Nonlinear Science-G. Nicolis 1995-06-22 . This book will be of great value to graduate students in physics, applied mathematics, chemistry, engineering and biology taking courses in nonlinear science and its applications, as well as to researchers and teachers involved in one way or another in this field.

Fixed Points and Topological Degree in Nonlinear Analysis-Jane Cronin 1995-01-05 The topological methods based on fixed-point theory and on local topological degree which have been developed by Leray, Schauder, Nirenberg, Cesari and others for the study of nonlinear differential equations are here described in detail, beginning with elementary considerations. The reader is not assumed to have any knowledge of topology beyond the theory of point sets in Euclidean n-space which ordinarily forms part of a course in advanced calculus. The methods are first developed for Euclidean n-space and applied to the study of existence and stability of periodic and almost-periodic solutions of systems of ordinary differential equations, both quasi-linear and with ``large'' nonlinearities. Then, after being extended to infinite-dimensional ``function-spaces'', these methods are applied to integral equations, partial differential equations and further problems concerning periodic solutions of ordinary differential equations.

Topological Methods for Set-Valued Nonlinear Analysis-

Topological Methods in Nonlinear Analysis- 2003

Introduction to Nonlinear Dispersive Equations-Felipe Linares 2014-12-15 This textbook introduces the well-posedness theory for initial-value problems of nonlinear, dispersive partial differential equations, with special focus on two key models, the Korteweg–de Vries equation and the nonlinear Schrödinger equation. A concise and self-contained treatment of background material (the Fourier transform, interpolation theory, Sobolev spaces, and the linear Schrödinger equation) prepares the reader to understand the main topics covered: the initial-value problem for the nonlinear Schrödinger equation and the generalized Korteweg–de Vries equation, properties of their solutions, and a survey of general classes of nonlinear dispersive equations of physical and mathematical significance. Each chapter ends with an expert account of recent developments and open problems, as well as exercises. The final chapter gives a detailed exposition of local well-posedness for the nonlinear Schrödinger equation, taking the reader to the forefront of recent research. The second edition of Introduction to Nonlinear Dispersive Equations builds upon the success of the first edition by the addition of updated material on the main topics, an expanded bibliography, and new exercises. Assuming only basic knowledge of complex analysis and integration theory, this book will enable graduate students and researchers to enter this actively developing field.

Nonlinear Analysis - Theory and Methods-Nikolaos S. Papageorgiou 2019-04-15 This book emphasizes those basic abstract methods and theories that are useful in the study of nonlinear boundary value problems. The content is developed over six chapters, providing a thorough introduction to the techniques used in

the variational and topological analysis of nonlinear boundary value problems described by stationary differential operators. The authors give a systematic treatment of the basic mathematical theory and constructive methods for these classes of nonlinear equations as well as their applications to various processes arising in the applied sciences. They show how these diverse topics are connected to other important parts of mathematics, including topology, functional analysis, mathematical physics, and potential theory. Throughout the book a nice balance is maintained between rigorous mathematics and physical applications. The primary readership includes graduate students and researchers in pure and applied nonlinear analysis.

Topological Degree Theory and Applications-Yeol Je Cho 2006-03-27 Since the 1960s, many researchers have extended topological degree theory to various non-compact type nonlinear mappings, and it has become a valuable tool in nonlinear analysis. Presenting a survey of advances made in generalizations of degree theory during the past decade, this book focuses on topological degree theory in normed spaces and its ap

Differential Equations with Applications-Paul D. Ritger 2000-01-01 Coherent, balanced introductory text focuses on initial- and boundary-value problems, general properties of linear equations, and the differences between linear and nonlinear systems. Includes large number of illustrative examples worked out in detail and extensive sets of problems. Answers or hints to most problems appear at end.

Algebraic Topology-Allen Hatcher 2002 An introductory textbook suitable for use in a course or for self-study, featuring broad coverage of the subject and a readable exposition, with many examples and exercises.

Algebraic Topology-William Fulton 2013-12-01 To the Teacher. This book is designed to introduce a student to some of the important ideas of algebraic topology by emphasizing the re lations of these ideas with other areas of mathematics. Rather than choosing one point of view of modem topology (homotopy theory, simplicial complexes, singular theory, axiomatic homology, differ ential topology, etc.), we concentrate our attention on concrete prob lems in low dimensions, introducing only as much algebraic machin ery as necessary for the problems we meet. This makes it possible to see a wider variety of important features of the subject than is usual in a beginning text. The book is designed for students of mathematics or science who are not aiming to become practicing algebraic topol ogists-without, we hope, discouraging budding topologists. We also feel that this approach is in better harmony with the historical devel opment of the subject. What would we like a student to know after a first course in to pology (assuming we reject the answer: half of what one would like the student to know after a second course in topology)? Our answers to this have guided the choice of material, which includes: under standing the relation between homology and integration, first on plane domains, later on Riemann surfaces and in higher dimensions; wind ing numbers and degrees of mappings, fixed-point theorems; appli cations such as the Jordan curve theorem, invariance of domain; in dices of vector fields and Euler characteristics; fundamental groups

An Introduction to Nonlinear Schrödinger Equations-Thierry Cazenave 1989

Topological Nonlinear Analysis II-Michele Matzeu 1997-06-01 The main purpose of the present volume is to give a survey of some of the most significant achievements obtained by topological methods in nonlin ear analysis during the last three decades. It is intended, at least partly, as a continuation of Topological Nonlinear Analysis: Degree, Singularity and Varia tions, published in 1995. The survey articles presented are concerned with three main streams of research, that is topological degree, singularity theory and variational methods, They reflect the personal taste of the authors, all of them well known and distinguished specialists. A common feature of these articles is to start with a historical introduction and conclude with recent results, giving a dynamic picture of the state of the art on these topics. Let us mention the fact that most of the materials in this book were pre sented by the authors at the "Second Topological Analysis Workshop on Degree, Singularity and Variations: Developments of the Last 25 Years," held in June 1995 at Villa Tuscolana, Frascati, near Rome. Michele Matzeu Alfonso Vignoli Editors Topological Nonlinear Analysis II Degree, Singularity and Variations Classical Solutions for a Perturbed N-Body System Gianfausto Dell 'A ntonio O. Introduction In this review I shall consider the perturbed N-body system, i.e., a system composed of N point bodies of masses ml, ... mN, described in cartesian co ordinates by the system of equations (0.1) where f) V'k,m == -£l--' m = 1, 2, 3.

Introduction to Experimental Nonlinear Dynamics-Lawrence N. Virgin 2000-03-28 A case

study in mechanical vibration introduces the subject of nonlinear dynamics and chaos.
Introduction to Nonlinear Oscillations-Vladimir I. Nekorkin 2015-04-01 A systematic outline of the basic theory of oscillations, combining several tools in a single textbook. The author explains fundamental ideas and methods, while equally aiming to teach students the techniques of solving specific (practical) or more complex problems. Following an introduction to fundamental notions and concepts of modern nonlinear dynamics, the text goes on to set out the basics of stability theory, as well as bifurcation theory in one and two-dimensional cases. Foundations of asymptotic methods and the theory of relaxation oscillations are presented, with much attention paid to a method of mappings and its applications. With each chapter including exercises and solutions, including computer problems, this book can be used in courses on oscillation theory for physics and engineering students. It also serves as a good reference for students and scientists in computational neuroscience.
Nonlinear Maps and their Applications-Clara Grácio 2014-02-18 In the field of Dynamical Systems, nonlinear iterative processes play an important role. Nonlinear mappings can be found as immediate models for many systems from different scientific areas, such as engineering, economics, biology, or can also be obtained via numerical methods permitting to solve non-linear differential equations. In both cases, the understanding of specific dynamical behaviors and phenomena is of the greatest interest for scientists. This volume contains papers that were presented at the International Workshop on Nonlinear Maps and their Applications (NOMA 2011) held in Évora, Portugal, on September 15-16, 2011. This kind of collaborative effort is of paramount importance in promoting communication among the various groups that work in dynamical systems and networks in their research theoretical studies as well as for applications. This volume is suitable for graduate students as well as researchers in the field.
Introduction to Nonlinear Aeroelasticity-Grigorios Dimitriadis 2017-03-10 Introduces the latest developments and technologies in the area of nonlinear aeroelasticity Nonlinear aeroelasticity has become an increasingly popular research area in recent years. There have been many driving forces behind this development, increasingly flexible structures, nonlinear control laws, materials with nonlinear characteristics, etc. Introduction to Nonlinear Aeroelasticity covers the theoretical basics in nonlinear aeroelasticity and applies the theory to practical problems. As nonlinear aeroelasticity is a combined topic, necessitating expertise from different areas, the book introduces methodologies from a variety of disciplines such as nonlinear dynamics, bifurcation analysis, unsteady aerodynamics, non-smooth systems and others. The emphasis throughout is on the practical application of the theories and methods, so as to enable the reader to apply their newly acquired knowledge. Key features: Covers the major topics in nonlinear aeroelasticity, from the galloping of cables to supersonic panel flutter. Discusses nonlinear dynamics, bifurcation analysis, numerical continuation, unsteady aerodynamics and non-smooth systems. Considers the practical application of the theories and methods. Covers nonlinear dynamics, bifurcation analysis and numerical methods. Accompanied by a website hosting Matlab code. Introduction to Nonlinear Aeroelasticity is a comprehensive reference for researchers and workers in industry and is also a useful introduction to the subject for graduate and undergraduate students across engineering disciplines.
Methods in Nonlinear Analysis-Kung-Ching Chang 2006-03-30 This book offers a systematic presentation of up-to-date material scattered throughout the literature from the methodology point of view. It reviews the basic theories and methods, with many interesting problems in partial and ordinary differential equations, differential geometry and mathematical physics as applications, and provides the necessary preparation for almost all important aspects in contemporary studies. All methods are illustrated by carefully chosen examples from mechanics, physics, engineering and geometry.
A Topological and Analog Computer Study of Certain Servomechanisms Employing Nonlinear Electronic Components-Richard Charles Lathrop 1951
Ten Mathematical Essays on Approximation in Analysis and Topology-Juan Ferrera 2005-04-26 This book collects 10 mathematical essays on approximation in Analysis and Topology by some of the most influent mathematicians of the last third of the 20th Century. Besides the papers contain the very ultimate results in each of their respective fields, many of them also include a series of historical remarks about the state of mathematics at the time they found their most celebrated results, as well as some of their personal circumstances originating them, which

makes particularly attractive the book for all scientist interested in these fields, from beginners to experts. These gem pieces of mathematical intra-history should delight to many forthcoming generations of mathematicians, who will enjoy some of the most fruitful mathematics of the last third of 20th century presented by their own authors. This book covers a wide range of new mathematical results. Among them, the most advanced characterisations of very weak versions of the classical maximum principle, the very last results on global bifurcation theory, algebraic multiplicities, general dependencies of solutions of boundary value problems with respect to variations of the underlying domains, the deepest available results in rapid monotone schemes applied to the resolution of non-linear boundary value problems, the intra-history of the the genesis of the first general global continuation results in the context of periodic solutions of nonlinear periodic systems, as well as the genesis of the coincidence degree, some novel applications of the topological degree for ascertaining the stability of the periodic solutions of some classical families of periodic second order equations, the resolution of a number of conjectures related to some very celebrated approximation problems in topology and inverse problems, as well as a number of applications to engineering, an extremely sharp discussion of the problem of approximating topological spaces by polyhedra using various techniques based on inverse systems, as well as homotopy expansions, and the Bishop-Phelps theorem. Key features: - It contains a number of seminal contributions by some of the most world leading mathematicians of the second half of the 20th Century. - The papers cover a complete range of topics, from the intra-history of the involved mathematics to the very last developments in Differential Equations, Inverse Problems, Analysis, Nonlinear Analysis and Topology. - All contributed papers are self-contained works containing rather complete list of references on each of the subjects covered. - The book contains some of the very last findings concerning the maximum principle, the theory of monotone schemes in nonlinear problems, the theory of algebraic multiplicities, global bifurcation theory, dynamics of periodic equations and systems, inverse problems and approximation in topology. - The papers are extremely well written and directed to a wide audience, from beginners to experts. An excellent occasion to become engaged with some of the most fruitful mathematics developed during the last decades.

Periodic Differential Equations in the Plane-Rafael Ortega 2019-05-06 Periodic differential equations appear in many contexts such as in the theory of nonlinear oscillators, in celestial mechanics, or in population dynamics with seasonal effects. The most traditional approach to study these equations is based on the introduction of small parameters, but the search of nonlocal results leads to the application of several topological tools. Examples are fixed point theorems, degree theory, or bifurcation theory. These well-known methods are valid for equations of arbitrary dimension and they are mainly employed to prove the existence of periodic solutions. Following the approach initiated by Massera, this book presents some more delicate techniques whose validity is restricted to two dimensions. These typically produce additional dynamical information such as the instability of periodic solutions, the convergence of all solutions to periodic solutions, or connections between the number of harmonic and subharmonic solutions. The qualitative study of periodic planar equations leads naturally to a class of discrete dynamical systems generated by homeomorphisms or embeddings of the plane. To study these maps, Brouwer introduced the notion of a translation arc, somehow mimicking the notion of an orbit in continuous dynamical systems. The study of the properties of these translation arcs is full of intuition and often leads to "non-rigorous proofs". In the book, complete proofs following ideas developed by Brown are presented and the final conclusion is the Arc Translation Lemma, a counterpart of the Poincaré–Bendixson theorem for discrete dynamical systems. Applications to differential equations and discussions on the topology of the plane are the two themes that alternate throughout the five chapters of the book.

Advanced Linear Algebra-Steven Roman 2007-09-20 This graduate level textbook covers an especially broad range of topics. The book first offers a careful discussion of the basics of linear algebra. It then proceeds to a discussion of modules, emphasizing a comparison with vector spaces, and presents a thorough discussion of inner product spaces, eigenvalues, eigenvectors, and finite dimensional spectral theory, culminating in the finite dimensional spectral theorem for normal operators. The new edition has been revised and contains a chapter on the QR decomposition, singular values and pseudoinverses, and a chapter on convexity, separation and positive solutions to linear

systems.
Topological Methods in the Study of Boundary Value Problems-Pablo Amster 2013-10-23 This textbook is devoted to the study of some simple but representative nonlinear boundary value problems by topological methods. The approach is elementary, with only a few model ordinary differential equations and applications, chosen in such a way that the student may avoid most of the technical difficulties and focus on the application of topological methods. Only basic knowledge of general analysis is needed, making the book understandable to non-specialists. The main topics in the study of boundary value problems are present in this text, so readers with some experience in functional analysis or differential equations may also find some elements that complement and enrich their tools for solving nonlinear problems. In comparison with other texts in the field, this one has the advantage of a concise and informal style, thus allowing graduate and undergraduate students to enjoy some of the beauties of this interesting branch of mathematics. Exercises and examples are included throughout the book, providing motivation for the reader.

A Topological Introduction To Nonlinear Analysis Robert F Brown