

Linear Vector Spaces And Cartesian Tensors

Functional Analysis
Quantum Non-Locality and Relativity
Linear Algebra: Concepts and Methods
Linear Spaces and Differentiation Theory
Elements of Linear Space
Matrices and Tensors in Physics
Mathematics For Physics: An Illustrated Handbook
Circuits, Matrices and Linear Vector Spaces
Non-Linear Elastic Deformations
Advanced Linear Algebra
Linear Algebra
Finite-Dimensional Vector Spaces
Exterior Analysis
Mathematical Physics
Irreducible Cartesian Tensors
Linear Vector Spaces and Cartesian Tensors
Mathematical Handbook for Scientists and Engineers
Linear Functional Analysis
Schaum's Outline of Tensor Calculus
Vectors, Pure and Applied
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A (terse) Introduction to Linear Algebra
Topological Vector Spaces and Distributions
Calculus in Vector Spaces, Revised Expanded
Composition Operators on Function Spaces
Foundations of Quantum Physics
Reproducing Kernels and their Applications
Mathematical Tools for Physicists
From Special Relativity to Feynman Diagrams
Advanced Linear Algebra
Calculus and Linear Algebra: Vector spaces, many-variable calculus, and differential equations
The Linear Algebra Survival Guide
Stepping into Virtual Reality
Optimization by Vector Space Methods
Russian-English Dictionary of Mathematics
Calculus in Vector Spaces
Non-archimedean Analysis
Semitopological Vector Spaces
Topics on Topological Vector Spaces
Applied Functional Analysis and Variational Methods in Engineering

Functional Analysis

The Linear Algebra Survival Guide offers a concise introduction to the difficult core topics of linear algebra, guiding you through the powerful graphic displays and visualization of Mathematica that make the most abstract theories seem simple - allowing you to tackle realistic problems using simple mathematical manipulations. This resource is therefore a guide to learning the content of Mathematica in a practical way, enabling you to manipulate potential solutions/outcomes, and learn creatively. No starting knowledge of the Mathematica system is required to use the book. Desktop, laptop, web-based versions of Mathematica are available on all major platforms. Mathematica Online for tablet and smartphone systems are also under development and increases the reach of the guide as a general reference, teaching and learning tool. Includes computational oriented information that complements the essential topics in linear algebra. Presents core topics in a simple, straightforward way with examples for exploring computational illustrations, graphics, and displays using Mathematica. Provides numerous examples of short code in the text, which can be modified for use with exercises to develop graphics displays for teaching, learning, and demonstrations.

Quantum Non-Locality and Relativity

Linear Algebra: Concepts and Methods

Virtual reality techniques are increasingly becoming indispensable in many areas. This book looks at how to generate advanced virtual reality worlds. It covers principles, techniques, devices and mathematical foundations, beginning with basic definitions, and then moving on to the latest results from current research and exploring the social implications of these. Very practical in its approach, the book is fully illustrated in colour and contains numerous examples, exercises and case studies. This textbook will allow students and practitioners alike to gain a practical understanding of virtual reality concepts, devices and possible applications.

Linear Spaces and Differentiation Theory

Elements of Linear Space

The new edition is significantly updated and expanded. This unique collection of review articles, ranging from fundamental concepts up to latest applications, contains individual contributions written by renowned experts in the relevant fields. Much attention is paid to ensuring fast access to the information, with each carefully reviewed article featuring cross-referencing, references to the most relevant publications in the field, and suggestions for further reading, both introductory as well as more specialized. While the chapters on group theory, integral transforms, Monte Carlo methods, numerical

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analysis, perturbation theory, and special functions are thoroughly rewritten, completely new content includes sections on commutative algebra, computational algebraic topology, differential geometry, dynamical systems, functional analysis, graph and network theory, PDEs of mathematical physics, probability theory, stochastic differential equations, and variational methods.

Matrices and Tensors in Physics

Linear Vector Spaces and Cartesian Tensors is primarily concerned with the theory of finite dimensional Euclidian spaces. It makes a careful distinction between real and complex spaces, with an emphasis on real spaces, and focuses on those elements of the theory that are especially important in applications to continuum mechanics. The geometric content of the theory and the distinction between matrices and tensors are emphasized, and absolute- and component-notation are both employed. While the mathematics is rigorous, the style is casual. Chapter 1 deals with the basic notion of a linear vector space; many examples of such spaces are given, including infinite-dimensional ones. The idea of a linear transformation of a vector space into itself is introduced and explored in Chapter 2. Chapter 3 deals with linear transformations on finite dimensional real Euclidean spaces (i.e., Cartesian tensors), focusing on symmetric tensors, orthogonal tensors, and the interaction of both in the kinetically important polar decomposition theorem. Chapter 4 exploits the ideas introduced in the first three

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chapters in order to construct the theory of tensors of rank four, which are important in continuum mechanics. Finally, Chapter 5 concentrates on applications of the earlier material to the kinematics of continua, to the notion of isotropic materials, to the concept of scalar invariant functions of tensors, and to linear dynamical systems. Exercises and problems of varying degrees of difficulty are included at the end of each chapter. Two appendices further enhance the text: the first is a short list of mathematical results that students should already be familiar with, and the second contains worked out solutions to almost all of the problems. Offering many unusual examples and applications, Linear Vector Spaces and Cartesian Tensors serves as an excellent text for advanced undergraduate or first year graduate courses in engineering mathematics and mechanics. Its clear writing style also makes this work useful as a self-study guide.

Mathematics For Physics: An Illustrated Handbook

Linear algebra is the study of vector spaces and the linear maps between them. It underlies much of modern mathematics and is widely used in applications. A (Terse) Introduction to Linear Algebra is a concise presentation of the core material of the subject--those elements of linear algebra that every mathematician, and everyone who uses mathematics, should know. It goes from the notion of a finite-dimensional vector space to the canonical forms of linear operators and their matrices, and covers along

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the way such key topics as: systems of linear equations, linear operators and matrices, determinants, duality, and the spectral theory of operators on inner-product spaces. The last chapter offers a selection of additional topics indicating directions in which the core material can be applied. The Appendix provides all the relevant background material. Written for students with some mathematical maturity and an interest in abstraction and formal reasoning, the book is self-contained and is appropriate for an advanced undergraduate course in linear algebra.

Circuits, Matrices and Linear Vector Spaces

This book presents a new basis for differential calculus. Classical differentiation in linear spaces of arbitrary dimension uses Banach spaces--but most function spaces are not Banach spaces. Any attempts to develop a theory of differentiation covering non-normable linear spaces have always involved arbitrary conditions. This book bases the theory of differentiability of linear spaces on the fundamental idea of reducing the differentiability of general maps to that of functions on the real numbers. And the property ``continuously differentiable'' is replaced by that of ``Lipschitz differentiable.'' The result is a more natural theory, of conceptual simplicity that leads to the the same categories of linear spaces, but in a more general setting.

Non-Linear Elastic Deformations

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Classic in the field covers application of theory of finite elasticity to solution of boundary-value problems, analysis of mechanical properties of solid materials capable of large elastic deformations. Problems. References.

Advanced Linear Algebra

This new volume shows how it is possible to further develop and essentially extend the theory of operators in infinite-dimensional vector spaces, which plays an important role in mathematics, physics, information theory, and control theory. The book describes new mathematical structures, such as hypernorms, hyperseminorms, hypermetrics, semitopological vector spaces, hypernormed vector spaces, and hyperseminormed vector spaces. It develops mathematical tools for the further development of functional analysis and broadening of its applications. Exploration of semitopological vector spaces, hypernormed vector spaces, hyperseminormed vector spaces, and hypermetric vector spaces is the main topic of this book. A new direction in functional analysis, called quantum functional analysis, has been developed based on polinormed and multinormed vector spaces and linear algebras. At the same time, normed vector spaces and topological vector spaces play an important role in physics and in control theory. To make this book comprehensible for the reader and more suitable for students with some basic knowledge in mathematics, denotations and definitions of the main mathematical concepts and structures used in the book are included

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in the appendix, making the book useful for enhancing traditional courses of calculus for undergraduates, as well as for separate courses for graduate students. The material of Semitopological Vector Spaces: Hypernorms, Hyperseminorms and Operators is closely related to what is taught at colleges and universities. It is possible to use a definite number of statements from the book as exercises for students because their proofs are not given in the book but left for the reader.

Linear Algebra

Calculus in Vector Spaces addresses linear algebra from the basics to the spectral theorem and examines a range of topics in multivariable calculus. This second edition introduces, among other topics, the derivative as a linear transformation, presents linear algebra in a concrete context based on complementary ideas in calculus, and explains differential forms on Euclidean space, allowing for Green's theorem, Gauss's theorem, and Stokes's theorem to be understood in a natural setting. Mathematical analysts, algebraists, engineers, physicists, and students taking advanced calculus and linear algebra courses should find this book useful.

Finite-Dimensional Vector Spaces

Text covers introduction to inner-product spaces, normed, metric spaces, and topological spaces; complete orthonormal sets, the Hahn-Banach Theorem and its consequences, and many other

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related subjects. 1966 edition.

Exterior Analysis

This unique book complements traditional textbooks by providing a visual yet rigorous survey of the mathematics used in theoretical physics beyond that typically covered in undergraduate math and physics courses. The exposition is pedagogical but compact, and the emphasis is on defining and visualizing concepts and relationships between them, as well as listing common confusions, alternative notations and jargon, and relevant facts and theorems. Special attention is given to detailed figures and geometric viewpoints. Certain topics which are well covered in textbooks, such as historical motivations, proofs and derivations, and tools for practical calculations, are avoided. The primary physical models targeted are general relativity, spinors, and gauge theories, with notable chapters on Riemannian geometry, Clifford algebras, and fiber bundles.

Mathematical Physics

Irreducible Cartesian Tensors

With an addendum by Wu Congxin (Harbin Institute of Technology) Linear Functional Analysis resulted from a series of lectures Orlicz gave in Beijing, China, 1958. The original edition was published in Chinese in 1963. It contains all the major theorems that would normally appear in a modern text, the results of special

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interest to the Polish school, and others which are not easily available elsewhere. Orlicz provided in this book some rare insight and motivation in the subject which was initiated by the Polish school. An addendum to some recent results in Orlicz spaces is included.

Linear Vector Spaces and Cartesian Tensors

This monograph covers the concept of cartesian tensors with the needs and interests of physicists, chemists and other physical scientists in mind. After introducing elementary tensor operations and rotations, spherical tensors, combinations of tensors are introduced, also covering Clebsch-Gordan coefficients. After this, readers from the physical sciences will find generalizations of the results to spinors and applications to quantum mechanics.

Mathematical Handbook for Scientists and Engineers

Convenient access to information from every area of mathematics: Fourier transforms, Z transforms, linear and nonlinear programming, calculus of variations, random-process theory, special functions, combinatorial analysis, game theory, much more.

Linear Functional Analysis

Engineers must make decisions regarding the distribution of expensive resources in a manner that

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will be economically beneficial. This problem can be realistically formulated and logically analyzed with optimization theory. This book shows engineers how to use optimization theory to solve complex problems. Unifies the large field of optimization with a few geometric principles. Covers functional analysis with a minimum of mathematics. Contains problems that relate to the applications in the book.

Schaum's Outline of Tensor Calculus

This lucid introduction for undergraduates and graduates proves fundamental for practitioners of theoretical physics and certain areas of engineering, like aerodynamics and fluid mechanics, and extremely valuable for mathematicians. This study guide teaches all the basics and effective problem-solving skills too.

Vectors, Pure and Applied

The first two chapters of the book deal, in a detailed way, with relativistic kinematics and dynamics, while in the third chapter some elementary concepts of General Relativity are given. Eventually, after an introduction to tensor calculus, a Lorentz covariant formulation of electromagnetism is given its quantization is developed. For a proper treatment of invariance and conservation laws in physics, an introductory chapter on group theory is given. This introduction is propedeutical to the discussion of conservation laws in the Lagrangian and Hamiltonian formalism, which will allow us to export this formalism

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to quantum mechanics and, in particular, to introduce linear operators on quantum states and their transformation laws. In the last part of the book we analyze, in the first quantized formalism, relativistic field theory for both boson and fermion fields. The second quantization of free fields is then introduced and some preliminary concepts of perturbation theory and Feynmann diagrams are given and some relevant examples are worked out.

Fundamentals of Linear Algebra

Calculus in Vector Spaces addresses linear algebra from the basics to the spectral theorem and examines a range of topics in multivariable calculus. This second edition introduces, among other topics, the derivative as a linear transformation, presents linear algebra in a concrete context based on complementary ideas in calculus, and explains differential forms on Euclidean space, allowing for Green's theorem, Gauss's theorem, and Stokes's theorem to be understood in a natural setting. Mathematical analysts, algebraists, engineers, physicists, and students taking advanced calculus and linear algebra courses should find this book useful.

A (terse) Introduction to Linear Algebra

Topological Vector Spaces and Distributions

Explains both the how and the why of linear algebra

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to get students thinking like mathematicians.

Calculus in Vector Spaces, Revised Expanded

Classic, widely cited, and accessible treatment offers an ideal supplement to many traditional linear algebra texts. "Extremely well-written and logical, with short and elegant proofs." — MAA Reviews. 1958 edition.

Composition Operators on Function Spaces

The First Part Of This Book Begins With An Introduction To Matrices Through Linear Transformations On Vector Spaces, Followed By A Discussion On The Algebra Of Matrices, Special Matrices, Linear Equations, The Eigenvalue Problem, Bilinear And Quadratic Forms, Kronecker Sum And Product Of Matrices. Other Matrices Which Occur In Physics, Such As The Rotation Matrix, Pauli Spin Matrices And Dirac Matrices, Are Then Presented. A Brief Account Of Infinite Matrices From The Point Of View Of Matrix Formulation Of Quantum Mechanics Is Also Included. The Emphasis In This Part Is On Linear Dependence And Independence Of Vectors And Matrices, Linear Combinations, Independent Parameters Of Various Special Matrices And Such Other Concepts As Help The Student In Obtaining A Clear Understanding Of The Subject. A Simplified Proof Of The Theorem That A Common Set Of Eigenvectors Can Be Found For Two Commuting

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Matrices Is Given. The Second Part Deals With Cartesian And General Tensors. Many Physical Situations Are Discussed Which Require The Use Of Second And Higher Rank Tensors, Such As Effective Mass Tensor, Moment Of Inertia Tensor, Stress, Strain And Elastic Constants, Piezoelectric Strain Coefficient Tensor, Etc. Einsteins Summation Convention Is Explained In Detail And Common Errors Arising In Its Use Are Pointed Out. Rules For Checking The Correctness Of Tensor Equations Are Given. This Is Followed By Four-Vectors In Special Relativity And Covariant Formulation Of Electrodynamics. This Part Comes To An End With The Concept Of Parallel Displacement Of Vectors In Riemannian Space And Covariant Derivative Of Tensors, Leading To The Curvature Tensors And Its Properties. Appendix I Has Expanded And Two New Appendices Have Been Added In This Edition.

Foundations of Quantum Physics

Covers a notably broad range of topics, including some topics not generally found in linear algebra books Contains a discussion of the basics of linear algebra

Reproducing Kernels and their Applications

This popular and successful text was originally written for a one-semester course in linear algebra at the sophomore undergraduate level. Consequently, the book deals almost exclusively with real finite

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dimensional vector spaces, but in a setting and formulation that permits easy generalisation to abstract vector spaces. A wide selection of examples of vector spaces and linear transformation is presented to serve as a testing ground for the theory. In the second edition, a new chapter on Jordan normal form was added which reappears here in expanded form as the second goal of this new edition, after the principal axis theorem. To achieve these goals in one semester it is necessary to follow a straight path, but this is compensated by a wide selection of examples and exercises. In addition, the author includes an introduction to invariant theory to show that linear algebra alone is incapable of solving these canonical forms problems. A compact, but mathematically clean introduction to linear algebra with particular emphasis on topics in abstract algebra, the theory of differential equations, and group representation theory.

Mathematical Tools for Physicists

From Special Relativity to Feynman Diagrams

This volume of the Mathematics Studies presents work done on composition operators during the last 25 years. Composition operators form a simple but interesting class of operators having interactions with different branches of mathematics and mathematical physics. After an introduction, the book deals with these operators on L_p -spaces. This study is useful in measurable dynamics, ergodic theory, classical

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mechanics and Markov process. The composition operators on functional Banach spaces (including Hardy spaces) are studied in chapter III. This chapter makes contact with the theory of analytic functions of complex variables. Chapter IV presents a study of these operators on locally convex spaces of continuous functions making contact with topological dynamics. In the last chapter of the book some applications of composition operators in isometries, ergodic theory and dynamical systems are presented. An interesting interplay of algebra, topology, and analysis is displayed. This comprehensive and up-to-date study of composition operators on different function spaces should appeal to research workers in functional analysis and operator theory, post-graduate students of mathematics and statistics, as well as to physicists and engineers.

Advanced Linear Algebra

The third edition of Quantum Non-Locality and Relativity has been carefully updated to reflect significant developments, including a new chapter covering important recent work in the foundations of physics. A new edition of the premier philosophical study of Bell's Theorem and its implication for the relativistic account of space and time Discusses Roderich Tumiulka's explicit, relativistic theory that can reproduce the quantum mechanical violation of Bell's inequality. Discusses the "Free Will Theorem" of John Conway and Simon Kochen Introduces philosophers to the relevant physics and demonstrates how philosophical analysis can help

inform physics

Calculus and Linear Algebra: Vector spaces, many-variable calculus, and differential equations

This book is meant to be a text for a first course in quantum physics. It is assumed that the student has had courses in Modern Physics and in mathematics through differential equations. The book is otherwise self-contained and does not rely on outside resources such as the internet to supplement the material. SI units are used throughout except for those topics for which atomic units are especially convenient. It is our belief that for a physics major a quantum physics textbook should be more than a one- or two-semester acquaintance. Consequently, this book contains material that, while germane to the subject, the instructor might choose to omit because of time limitations. There are topics and examples included that are not normally covered in introductory textbooks. These topics are not necessarily too advanced, they are simply not usually covered. We have not, however, presumed to tell the instructor which topics must be included and which may be omitted. It is our intention that omitted subjects are available for future reference in a book that is already familiar to its owner. In short, it is our hope that the student will use the book as a reference after having completed the course. We have included at the end of most chapters a "Retrospective" of the chapter. This is not meant to be merely a summary, but, rather, an overview of the importance

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of the material and its place in the context of previous and forthcoming chapters.

The Linear Algebra Survival Guide

An essential book for anyone using Russian mathematical and scientific literature. The Russian-English Dictionary of Mathematics embraces all major branches of mathematics from elementary topics to advanced studies in topology and discrete mathematics. Terms from the newest branches of mathematics, such as the theories of games, trees, knots, and braids, are included as well. Containing more than 27,000 entries, the Russian-English Dictionary of Mathematics is larger and provides a broader scope than any other bilingual mathematics dictionary now in use. Many adjectives and verbs are included, and a copious amount of synonyms are provided for various terms. Secondary terms are grouped under principal terms for easier reference. The Russian-English Dictionary of Mathematics provides the most comprehensive vocabulary aid available for translators, readers, and writers of Russian mathematical and scientific literature.

Stepping into Virtual Reality

The First International Congress of the International Society for Analysis, its Applications and Computations (ISAAC'97) was held at the University of Delaware from 3 to 7 June 1997. As specified in the invitation of the President Professor Robert P. Gilbert of the ISAAC, we organized the session on

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Reproducing Kerneis and Their Applications. In our session, we presented 24 engaging talks on topics of current interest to the research community. As suggested and organized by Professor Gilbert, we hereby publish its Proceedings. Rather than restricting the papers to Congress participants, we asked the leading mathematicians in the field of the theory of reproducing kern els to submit papers. However, due to time restrietions and a compulsion to limit the Proceedings a reasonable size, we were unable to obtain a comprehensive treatment of the theory of reproducing kernels. Nevertheless, we hope this Proceedings of the First International Conference on reproducing kerneis will become a significant reference volume. Indeed, we believe that the theory of reproducing kernels will stand out as a fundamental and beautiful contribution in mathematical sciences with a broad array of applications to other areas of mathematics and science. We would like to thank Professor Robert Gilbert for his substantial contri bu tions to the Congress and to our Proceedings. We also express our sincere thanks to the staff of the University of Delaware for their manifold cooperation in organizing the Congress.

Optimization by Vector Space Methods

This high-level text explains the mathematics behind basic circuit theory. It covers matrix algebra, the basic theory of n -dimensional spaces, and applications to linear systems. Numerous problems. 1963 edition.

Russian-English Dictionary of Mathematics

Any student of linear algebra will welcome this textbook, which provides a thorough treatment of this key topic. Blending practice and theory, the book enables the reader to learn and comprehend the standard methods, with an emphasis on understanding how they actually work. At every stage, the authors are careful to ensure that the discussion is no more complicated or abstract than it needs to be, and focuses on the fundamental topics. The book is ideal as a course text or for self-study. Instructors can draw on the many examples and exercises to supplement their own assignments. End-of-chapter sections summarise the material to help students consolidate their learning as they progress through the book.

Calculus in Vector Spaces

Exterior analysis uses differential forms (a mathematical technique) to analyze curves, surfaces, and structures. Exterior Analysis is a first-of-its-kind resource that uses applications of differential forms, offering a mathematical approach to solve problems in defining a precise measurement to ensure structural integrity. The book provides methods to study different types of equations and offers detailed explanations of fundamental theories and techniques to obtain concrete solutions to determine symmetry. It is a useful tool for structural, mechanical and electrical engineers, as well as physicists and

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mathematicians. Provides a thorough explanation of how to apply differential equations to solve real-world engineering problems Helps researchers in mathematics, science, and engineering develop skills needed to implement mathematical techniques in their research Includes physical applications and methods used to solve practical problems to determine symmetry

Non-archimedean Analysis

Semitopological Vector Spaces

Elements of Linear Space is a detailed treatment of the elements of linear spaces, including real spaces with no more than three dimensions and complex n -dimensional spaces. The geometry of conic sections and quadric surfaces is considered, along with algebraic structures, especially vector spaces and transformations. Problems drawn from various branches of geometry are given. Comprised of 12 chapters, this volume begins with an introduction to real Euclidean space, followed by a discussion on linear transformations and matrices. The addition and multiplication of transformations and matrices are given emphasis. Subsequent chapters focus on some properties of determinants and systems of linear equations; special transformations and their matrices; unitary spaces; and some algebraic structures. Quadratic forms and their applications to geometry are also examined, together with linear transformations in general vector spaces. The book

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concludes with an evaluation of singular values and estimates of proper values of matrices, paying particular attention to linear transformations always on a unitary space of dimension n over the complex field. This book will be of interest to both undergraduate and more advanced students of mathematics.

Topics on Topological Vector Spaces

Advanced Linear Algebra features a student-friendly approach to the theory of linear algebra. The author's emphasis on vector spaces over general fields, with corresponding current applications, sets the book apart. He focuses on finite fields and complex numbers, and discusses matrix algebra over these fields. The text then proceeds to cover vector spaces in depth. Also discussed are standard topics in linear algebra including linear transformations, Jordan canonical form, inner product spaces, spectral theory, and, as supplementary topics, dual spaces, quotient spaces, and tensor products. Written in clear and concise language, the text sticks to the development of linear algebra without excessively addressing applications. A unique chapter on "How to Use Linear Algebra" is offered after the theory is presented. In addition, students are given pointers on how to start a research project. The proofs are clear and complete and the exercises are well designed. In addition, full solutions are included for almost all exercises.

Applied Functional Analysis and Variational Methods in Engineering

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Fundamentals of Linear Algebra is like no other book on the subject. By following a natural and unified approach to the subject it has, in less than 250 pages, achieved a more complete coverage of the subject than books with more than twice as many pages. For example, the textbooks in use in the United States prove the existence of a basis only for finite dimensional vector spaces. This book proves it for any given vector space. With his experience in algebraic geometry and commutative algebra, the author defines the dimension of a vector space as its Krull dimension. By doing so, most of the facts about bases when the dimension is finite, are trivial consequences of this definition. To name one, the replacement theorem is no longer needed. It becomes obvious that any two bases of a finite dimensional vector space contain the same number of vectors. Moreover, this definition of the dimension works equally well when the geometric objects are nonlinear. Features: Presents theories and applications in an attempt to raise expectations and outcomes The subject of linear algebra is presented over arbitrary fields Includes many non-trivial examples which address real-world problems About the Author: Dr. J.S. Chahal is a professor of mathematics at Brigham Young University. He received his Ph.D. from Johns Hopkins University and after spending a couple of years at the University of Wisconsin as a post doc, he joined Brigham Young University as an assistant professor and has been there ever since. He specializes and has published a number of papers about number theory. For hobbies, he likes to travel and hike, the reason he accepted the position at Brigham Young University

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