

Get Free Linear
Algebra Gateway
To Mathematics
Linear

Algebra
Gateway
To Mathem
atics

*Geared toward upper-
level undergraduates
and graduate students,
this text establishes that*

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*projective geometry
and linear algebra are
essentially identical.
The supporting
evidence consists of
theorems offering an
algebraic
demonstration of
certain geometric
concepts. 1952 edition.
Basic Algebra and
Advanced Algebra
systematically develop*

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concepts and tools in algebra that are vital to every mathematician, whether pure or applied, aspiring or established. Together, the two books give the reader a global view of algebra and its role in mathematics as a whole. The presentation includes blocks of problems that

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introduce additional topics and applications to science and engineering to guide further study. Many examples and hundreds of problems are included, along with a separate 90-page section giving hints or complete solutions for most of the problems. Linear algebra is a

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living, active branch of mathematics which is central to almost all other areas of mathematics, both pure and applied, as well as computer science, the physical and social sciences, and engineering. It entails an extensive corpus of theoretical results as well as a large body of

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computational

techniques. The book is intended to be used in one of several possible ways: (1) as a self-study guide; (2) as a textbook for a course in advanced linear algebra, either at the upper-class undergraduate level or at the first-year graduate level; or (3)

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as a reference book. It is also designed to prepare a student for the linear algebra portion of prelim exams or PhD qualifying exams. The volume is self-contained to the extent that it does not assume any previous formal knowledge of linear algebra, though the

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reader is assumed to have been exposed, at least informally, to some basic ideas and techniques, such as the solution of a small system of linear equations over the real numbers. More importantly, it does assume a seriousness of purpose and a modicum of

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mathematical

*sophistication. The
book also contains over
1000 exercises, many
of which are very
challenging.*

*David Poole's
innovative LINEAR
ALGEBRA: A
MODERN
INTRODUCTION, 4e
emphasizes a vectors
approach and better*

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*prepares students to
make the transition
from computational to
theoretical
mathematics.*

*Balancing theory and
applications, the book
is written in a
conversational style
and combines a
traditional presentation
with a focus on student-
centered learning.*

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Theoretical, computational, and applied topics are presented in a flexible yet integrated way. Stressing geometric understanding before computational techniques, vectors and vector geometry are introduced early to help students visualize concepts and develop

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*mathematical maturity
for abstract thinking.*

*Additionally, the book
includes ample*

applications drawn

from a variety of

disciplines, which

reinforce the fact that

linear algebra is a

valuable tool for

modeling real-life

problems. Important

Notice: Media content

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*referenced within the
product description or
the product text may
not be available in the
ebook version.*

*Exploring extended
vector algebra with
Mathematica*

*Grassmann Algebra
Volume 1: Foundations
Basic Algebra*

Matrix Gateway to
Page 13/171

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*Geometric Algebra,
Spacetime and Spinors*

Matrix algebra has
been called "the
arithmetic of higher
mathematics" [Be].

We think the basis for
a better arithmetic has
long been available,
but its versatility has
hardly been
appreciated, and it has
not yet been integrated

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into the mainstream of mathematics. We refer to the system commonly called 'Clifford Algebra', though we prefer the name 'Geometric Algebm' suggested by Clifford himself.

Many distinct algebraic systems have been adapted or developed to express

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geometric relations
and describe
geometric structures.
Especially notable are
those algebras which
have been used for
this purpose in
physics, in particular,
the system of complex
numbers, the
quaternions, matrix
algebra, vector, tensor
and spinor algebras

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and the algebra of differential forms.

Each of these geometric algebras has some significant advantage over the others in certain applications, so no one of them provides an adequate algebraic structure for all purposes of geometry and physics. At the

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same time, the algebras overlap considerably, so they provide several different mathematical representations for individual geometrical or physical ideas.

Linear Algebra: A Geometric Approach, Second Edition, is a text that not only presents the standard

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computational aspects
of linear algebra and
interesting
applications, it guides
students to think about
mathematical concepts
and write rigorous
mathematical
arguments. This
thought-provoking
introduction to the
subject and its myriad
applications is

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interesting to the science or engineering student but will also help the mathematics student make the transition to more abstract advanced courses. The second edition has been updated with additional examples and exercises and has been streamlined for

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easier teaching and
studying.

This book enables the reader to discover elementary concepts of geometric algebra and its applications with lucid and direct explanations. Why would one want to explore geometric algebra? What if there existed a universal

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mathematical

language that allowed one: to make rotations in any dimension with simple formulas, to see spinors or the Pauli matrices and their products, to solve problems of the special theory of relativity in three-dimensional Euclidean space, to formulate

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quantum mechanics
without the imaginary
unit, to easily solve
difficult problems of
electromagnetism, to
treat the Kepler
problem with the
formulas for a
harmonic oscillator, to
eliminate unintuitive
matrices and tensors,
to unite many
branches of

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mathematical physics?

What if it were possible to use that same framework to generalize the complex numbers or fractals to any dimension, to play with geometry on a computer, as well as to make calculations in robotics, ray-tracing and brain science? In

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addition, what if such a language provided a clear, geometric interpretation of mathematical objects, even for the imaginary unit in quantum mechanics? Such a mathematical language exists and it is called geometric algebra. High school students have the

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potential to explore it,
and undergraduate
students can master it.
The universality, the
clear geometric
interpretation, the
power of
generalizations to any
dimension, the new
insights into known
theories, and the
possibility of
computer

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implementations make geometric algebra a thrilling field to unearth.

Further Linear Algebras is a natural sequel to the authors' highly acclaimed SUMS volume "Basic Linear Algebra". The more advanced topics covered here take the reader to the very

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heart of the subject,
and include inner
product spaces, direct
sums of subspaces, the
primary
decomposition
theorem and various
canonical forms for
matrices. Furthermore,
the authors provide a
brief introduction to
the use of MAPLE in
linear algebra

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calculations, and biographical profiles of eminent mathematicians associated with the subject. An introductory chapter recaps the prerequisites (for those readers unfamiliar with the first volume), and a wide range of worked

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examples and
exercises (with
solutions) are
strategically placed
throughout the text to
consolidate
understanding.

Elementary Linear
Algebra
MATRIX AND
LINEAR ALGEBRA
AIDED WITH
MATLAB

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Lectures on Linear

Algebra

Sage for

Undergraduates

Linear Algebra

Modified version of
the textbook for
adoption at North
Seattle College.

Grassmann Algebra

Volume 1:

Foundations

Exploring extended

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vector algebra with
Mathematica
Grassmann algebra
extends vector
algebra by
introducing the
exterior product to
algebraicize the
notion of linear
dependence. With it,
vectors may be
extended to higher-
grade entities:

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bivectors, trivectors,
... multivectors. The
extensive exterior
product also has a
regressive dual: the
regressive product.
The pair behaves a
little like the Boolean
duals of union and
intersection. By
interpreting one of
the elements of the
vector space as an

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origin point, points can be defined, and the exterior product can extend points into higher-grade located entities from which lines, planes and multiplanes can be defined.

Theorems of Projective Geometry are simply formulae involving these

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entities and the dual products. By introducing the (orthogonal) complement operation, the scalar product of vectors may be extended to the interior product of multivectors, which in this more general case may no longer result in a

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scalar. The notion of the magnitude of vectors is extended to the magnitude of multivectors: for example, the magnitude of the exterior product of two vectors (a bivector) is the area of the parallelogram formed by them. To develop these

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foundational concepts, we need only consider entities which are the sums of elements of the same grade. This is the focus of this volume. But the entities of Grassmann algebra need not be of the same grade, and the possible product

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types need not be constricted to just the exterior, regressive and interior products. For example quaternion algebra is simply the Grassmann algebra of scalars and bivectors under a new product operation. Clifford,

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geometric and higher order hypercomplex algebras, for example the octonions, may be defined similarly. If to these we introduce Clifford's invention of a scalar which squares to zero, we can define entities (for example dual quaternions) with

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which we can perform elaborate transformations. Exploration of these entities, operations and algebras will be the focus of the volume to follow this. There is something fascinating about the beauty with which the mathematical structures that

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Hermann

Grassmann

discovered describe
the physical world,
and something also
fascinating about
how these beautiful
structures have been
largely lost to the
mainstreams of
mathematics and
science. He wrote his
seminal

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Ausdehnungslehre
(Die
Ausdehnungslehre.
Vollständig und in
strenger Form) in
1862. But it was not
until the latter part
of his life that he
received any
significant
recognition for it,
most notably by
Gibbs and Clifford.

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In recent times
David Hestenes'
Geometric Algebra
must be given the
credit for much of
the emerging
awareness of Grass-
mann's innovation.
In the hope that the
book be accessible to
scientists and
engineers, students
and professionals

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alike, the text attempts to avoid any terminology which does not make an essential contribution to an understanding of the basic concepts. Some familiarity with basic linear algebra may however be useful. The book is written using Mathematica,

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a powerful system for doing mathematics on a computer. This enables the theory to be cross-checked with computational explorations.

However, a knowledge of Mathematica is not essential for an appreciation of

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Grassmann's beautiful ideas. Linear algebra permeates mathematics, perhaps more so than any other single subject. It plays an essential role in pure and applied mathematics, statistics, computer science, and many

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aspects of physics
and engineering.

This book conveys in
a user-friendly way
the basic and
advanced techniques
of linear algebra
from the point of
view of a working
analyst. The
techniques are
illustrated by a wide
sample of

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applications and examples that are chosen to highlight the tools of the trade. In short, this is material that the author wishes he had been taught as a graduate student. Roughly the first third of the book covers the basic material of a first

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course in linear algebra. The remaining chapters are devoted to applications drawn from vector calculus, numerical analysis, control theory, complex analysis, convexity and functional analysis. In particular, fixed point theorems,

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extremal problems, matrix equations, zero location and eigenvalue location problems, and matrices with nonnegative entries are discussed.

Appendices on useful facts from analysis and supplementary information from complex function

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theory are also provided for the convenience of the reader. The book is suitable as a text or supplementary reference for a variety of courses on linear algebra and its applications, as well as for self-study. This text for a second course in

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linear algebra, aimed at math majors and graduates, adopts a novel approach by banishing determinants to the end of the book and focusing on understanding the structure of linear operators on vector spaces. The author has taken unusual

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care to motivate concepts and to simplify proofs. For example, the book presents - without having defined determinants - a clean proof that every linear operator on a finite-dimensional complex vector space has an eigenvalue. The book

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starts by discussing vector spaces, linear independence, span, basics, and dimension. Students are introduced to inner-product spaces in the first half of the book and shortly thereafter to the finite- dimensional spectral theorem. A variety of interesting

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exercises in each chapter helps students understand and manipulate the objects of linear algebra. This second edition features new chapters on diagonal matrices, on linear functionals and adjoints, and on the spectral theorem; some sections, such

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as those on self-adjoint and normal operators, have been entirely rewritten; and hundreds of minor improvements have been made throughout the text.

A Unified Language
for Mathematics and
Physics

Mathematics for
Machine Learning

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Representation

Theory of Finite
Groups

Brain Signals

Abstract Algebra

This text develops
linear algebra with the
view that it is an
important gateway
connecting elementary
mathematics to more
advanced subjects,
such as advanced

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calculus, systems of differential equations, differential geometry, and group representations. The purpose of this book is to provide a treatment of this subject in sufficient depth to prepare the reader to tackle such further material. The text starts with vector

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spaces, over the sets of real and complex numbers, and linear transformations between such vector spaces. Later on, this setting is extended to general fields. The reader will be in a position to appreciate the early material on this more general level with minimal effort.

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Notable features of the text include a treatment of determinants, which is cleaner than one often sees, and a high degree of contact with geometry and analysis, particularly in the chapter on linear algebra on inner product spaces. In addition to studying

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linear algebra over general fields, the text has a chapter on linear algebra over rings.

There is also a chapter on special structures, such as quaternions, Clifford algebras, and octonions.

This book serves as an introduction to calculus on normed vector spaces at a

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higher undergraduate or beginning graduate level. The prerequisites include basic calculus and linear algebra, as well as a certain mathematical maturity. All the important topology and functional analysis topics are introduced where

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necessary. In its attempt to show how calculus on normed vector spaces extends the basic calculus of functions of several variables, this book is one of the few textbooks to bridge the gap between the available elementary texts and high level texts. The inclusion of

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many non-trivial applications of the theory and interesting exercises provides motivation for the reader.

"I recommend this book for its extensive coverage of topics not easily found elsewhere and for its focus on applications".

Zentralblatt

Page 64/171

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MATH" The book is an excellent source on linear algebra, matrix theory and applications in statistics and econometrics, and is unique in many ways. I recommend it to anyone interested in these disciplines, and especially in how they benefit from one

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another". Statistical
Papers, 2000

This text explores how Clifford algebras and spinors have been sparking a collaboration and bridging a gap between Physics and Mathematics. This collaboration has been the consequence of a growing awareness of

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the importance of algebraic and geometric properties in many physical phenomena, and of the discovery of common ground through various touch points: relating Clifford algebras and the arising geometry to so-called spinors, and to their three definitions

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(both from the mathematical and physical viewpoint). The main point of contact are the representations of Clifford algebras and the periodicity theorems. Clifford algebras also constitute a highly intuitive formalism, having an intimate

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relationship to
quantum field theory.

The text strives to
seamlessly combine
these various

viewpoints and is
devoted to a wider
audience of both
physicists and
mathematicians.

Among the existing
approaches to Clifford
algebras and spinors

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this book is unique in that it provides a didactical presentation of the topic and is accessible to both students and researchers. It emphasizes the formal character and the deep algebraic and geometric completeness, and merges them with the

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physical applications. The style is clear and precise, but not pedantic. The sole prerequisite is a course in Linear Algebra which most students of Physics, Mathematics or Engineering will have covered as part of their undergraduate studies.

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Linear Algebra:

Gateway to

Mathematics: Second

Edition

Advanced

Engineering Analysis

Linear Algebra Done

Right

Famous Websites in

Mathematics

No Bullshit Guide to

Linear Algebra

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and free competitor
to expensive
software like
Maple™,
Mathematica®,
Magma, and
MATLAB®, Sage
offers anyone with
access to a web
browser the ability
to use cutting-edge
mathematical
software and
display his or her

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**results for others,
often with stunning
graphics. This book
is a gentle
introduction to Sage
for undergraduate
students toward the
end of Calculus II
(single-variable
integral calculus) or
higher-level course
work such as
Multivariate
Calculus,**

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Differential Equations, Linear Algebra, or Math Modeling. The book assumes no background in computer science, but the reader who finishes the book will have learned about half of a first semester Computer Science I course, including large parts

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**of the Python
programming
language. The
audience of the
book is not only
math majors, but
also physics,
engineering,
finance, statistics,
chemistry, and
computer science
majors.**

**Ecrit entre 1482 et
1487, De Arte**

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Gladiatoria

Dimicandi (L'art de combattre du spadassin) est un traité détaillant le combat à l'épée longue, à la dague, à mains nues, à la hache d'armes. Cet ouvrage unique est le témoignage de la conceptualisation des principes de l'escrime par les

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Italiens durant leur Renaissance. Il présente, côte à côte, le manuscrit original pisan du XVe siècle de Maestro Filippo Vadi et les explications pratiques modernes de Maître Olivier Patrouix-Gracia, illustrées par plus de 500 photos en

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situation d'époque.
Toutes les
techniques
représentées dans
cet ouvrage
s'inscrivent dans
une tradition
purement martiale
du combat de
l'époque, dont la
finalité mortelle
n'est nullement
artistique, même si
l'ouvrage brille

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**d'une richesse
spirituelle
indéniable et
approfondit l'origine
des techniques
actuelles de combat
à l'épée. Pierre
angulaire des AMHE
(Arts Martiaux
Historiques
Européens), le traité
de Maître Vadi offre
aux pratiquants
d'escrime**

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**médiévale, aux
chercheurs de l'art
du combat, aux
historiens comme
aux amoureux de
l'Europe ancienne,
une source de
connaissance
incomparable. Avec
le traité de Hans
Talhoffer (Le
combat médiéval à
travers le duel
judiciaire,**

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1443-1467), il fait partie des rares ouvrages en langue française sur le sujet et est à ce titre indispensable dans la bibliothèque du chercheur en Histoire européenne.

A unified treatment of the generation and analysis of brain-generated

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electromagnetic fields. In Brain Signals, Risto Ilmoniemi and Jukka Sarvas present the basic physical and mathematical principles of magnetencephalography (MEG) and electroencephalography (EEG), describing what kind of

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information is available in the neuroelectromagnetic field and how the measured MEG and EEG signals can be analyzed. Unlike most previous works on these topics, which have been collections of writings by different authors using different

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conventions, this book presents the material in a unified manner, providing the reader with a thorough understanding of basic principles and a firm basis for analyzing data generated by MEG and EEG. The book first provides a brief introduction to brain

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states and the early history of EEG and MEG, describes the generation of electromagnetic fields by neuronal activity, and discusses the electromagnetic forward problem. The authors then turn to EEG and MEG analysis, offering a review of

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linear and matrix algebra and basic statistics needed for analysis of the data, and presenting several analysis methods: dipole fitting; the minimum norm estimate (MNE); beamforming; the multiple signal classification algorithm (MUSIC),

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including RAP-
MUSIC with the RAP
dilemma and TRAP-
MUSIC, which
removes the RAP
dilemma;
independent
component analysis
(ICA); and blind
source separation
(BSS) with joint
diagonalization.
Discusses in a
concise but

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**thorough manner
fundamental
statement of the
theory, principles
and methods on
vectors and vector
spaces, matrix
analysis, ordinary
and partial
differential
equations, Fourier
analysis and
transforms, vector
differential calculus,**

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**vector integral
calculus, frames of
reference,
variational calculus,
canonical
transformations,
and Hamilton-
Jacobi theory.
Geometric Algebra
Mathematical
Statistics
Linear Algebra in
Action
Further Linear**

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**Algebra
Innovative
Approaches to
Undergraduate
Mathematics
Courses Beyond
Calculus**

Representation
Theory of Finite
Groups is a five
chapter text that
covers the
standard material

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of representation theory. This book starts with an overview of the basic concepts of the subject, including group characters, representation modules, and the rectangular representation.

The succeeding

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chapters describe the features of representation theory of rings with identity and finite groups.

These topics are followed by a discussion of some of the application of the theory of characters, along

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with some classical theorems. The last chapter deals with the construction of irreducible representations of groups. This book will be of great value to graduate students who wish to acquire some knowledge of

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representation
theory.

The first book of
its kind, New
Foundations in
Mathematics: The
Geometric
Concept of
Number uses
geometric algebra
to present an
innovative
approach to

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elementary and
advanced
mathematics.

Geometric algebra
offers a simple and
robust means of
expressing a wide
range of ideas in
mathematics,
physics, and
engineering. In
particular,
geometric algebra

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extends the real number system to include the concept of direction, which underpins much of modern mathematics and physics. Much of the material presented has been developed from

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undergraduate
courses taught by
the author over the
years in linear
algebra, theory of
numbers,
advanced calculus
and vector
calculus,
numerical
analysis, modern
abstract algebra,
and differential

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geometry. The principal aim of this book is to present these ideas in a freshly coherent and accessible manner. New Foundations in Mathematics will be of interest to undergraduate and graduate students

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of mathematics and physics who are looking for a unified treatment of many important geometric ideas arising in these subjects at all levels. The material can also serve as a supplemental textbook in some

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or all of the areas mentioned above and as a reference book for professionals who apply mathematics to engineering and computational areas of mathematics and physics.

This textbook covers the material

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for an
undergraduate
linear algebra
course: vectors,
matrices, linear
transformations,
computational
techniques,
geometric
constructions, and
theoretical
foundations. The
explanations are

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given in an informal conversational tone. The book also contains 100+ problems and exercises with answers and solutions. A special feature of this textbook is the prerequisites chapter that

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covers topics from high school math, which are necessary for learning linear algebra. The presence of this chapter makes the book suitable for beginners and the general audience—readers need not be math experts to

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read this book.

Another unique aspect of the book are the applications chapters (Ch 7, 8, and 9) that discuss applications of linear algebra to engineering, computer science, economics, chemistry,

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machine learning,
and even quantum
mechanics.

"This book is
intended for first-
and second-year
undergraduates
arriving with
average
mathematics
grades ... The
strength of the text
is in the large

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number of
examples and the
step-by-step
explanation of
each topic as it is
introduced. It is
compiled in a way
that allows
distance learning,
with explicit
solutions to all of
the set problems
freely available

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online <http://www.oup.co.uk/companions/singh>" -- From preface.

Linear Algebra and
Projective
Geometry
Instructor's Guide
to Linear Algebra.
Gateway to
Mathematics
The Linear Algebra
a Beginning

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Graduate Student
Ought to Know
Basic Linear
Algebra

An Inquiry Based
Approach

***Linear Algebra:
Gateway to
Mathematics uses
linear algebra as a
vehicle to
introduce students
to the inner***

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***workings of
mathematics. The
structures and
techniques of
mathematics in
turn provide an
accessible
framework to
illustrate the
powerful and
beautiful results
about vector
spaces and linear
transformations.***

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The unifying concepts of linear algebra reveal the analogies among three primary examples: Euclidean spaces, function spaces, and collections of matrices. Students are gently introduced to abstractions of higher

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**mathematics
through
discussions of the
logical structure of
proofs, the need to
translate
terminology into
notation, and
efficient ways to
discover and
present proofs.
Application of
linear algebra and
concrete examples**

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***tie the abstract
concepts to
familiar objects
from algebra,
geometry,
calculus, and
everyday life.***

***Students will finish
a course using this
text with an
understanding of
the basic results of
linear algebra and
an appreciation of***

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the beauty and utility of mathematics. They will also be fortified with a degree of mathematical maturity required for subsequent courses in abstract algebra, real analysis, and elementary topology. Students

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who have prior background in dealing with the mechanical operations of vectors and matrices will benefit from seeing this material placed in a more general context. With the inclusion of applications of

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***singular value
decomposition
(SVD) and principal
component
analysis (PCA) to
image compression
and data analysis,
this edition
provides a strong
foundation of
linear algebra
needed for a
higher study in
signal processing.***

***The use of MATLAB
in the study of
linear algebra for a
variety of
computational
purposes and the
programmes
provided in this
text are the most
attractive features
of this book which
strikingly
distinguishes it
from the existing***

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***linear algebra
books needed as
pre-requisites for
the study of
engineering
subjects. This book
is highly suitable
for undergraduate
as well as
postgraduate
students of
mathematics,
statistics, and all
engineering***

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disciplines. The book will also be useful to Ph.D. students for relevant mathematical resources. NEW TO THIS EDITION The Third Edition of this book includes:

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