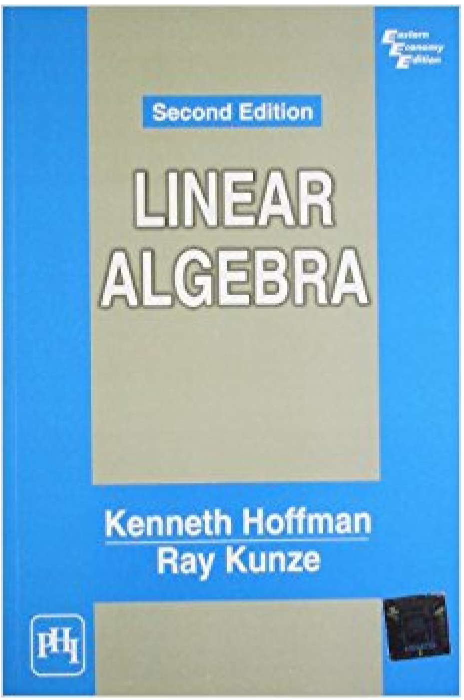
Linear Algebra (2nd Edition)



Synopsis

A comprehensive treatment of the subject. How it differs from the version: the first part of the book contains more examples concerning linear equations and computations with matrices. In addition, there are more problems of an elementary nature designed to clarify the basic computational aspects of the subject. The material on characteristic values, characteristic vectors, and diagonalization of matrices is reorganized so that the elementary and geometrically intuitive concepts are presented first.

Book Information

Paperback
Publisher: PHI; 2 edition (2009)
Language: English
ISBN-10: 8120302702
ISBN-13: 978-8120302709
Package Dimensions: 8.7 x 5.9 x 0.8 inches
Shipping Weight: 15.5 ounces
Average Customer Review: 4.5 out of 5 stars 38 customer reviews
Best Sellers Rank: #379,621 in Books (See Top 100 in Books) #173 inÃ Â Books > Science & Math > Mathematics > Pure Mathematics > Algebra > Linear

Customer Reviews

A comprehensive treatment of the subject. How it differs from the version: the first part of the book contains more examples concerning linear equations and computations with matrices. In addition, there are more problems of an elementary nature designed to clarify the basic computational aspects of the subject. The material on characteristic values, characteristic vectors, and diagonalization of matrices is reorganized so that the elementary and geometrically intuitive concepts are presented first.

Excellent book on abstract linear algebra. It’s very easy to read, its organized well and it has nice exercises. I hated taking linear algebra course where all we did was solving n by n matrices and row reduce. I didn’t really learn anything in that course.Linear algebra is an important subject to know really well before diving into other areas of mathematics. You can’t really move on without knowing linear algebra.

I used this book in a Linear Algebra II course. I will admit at first I loathed Hoffman and Kunze. To say that it was drastically different and more difficult from my first Lin Al textbook would be an understatement. In my first Linear Algebra class I could desultorily flip through the textbook 30 minutes before tests and make 100s. Not so with Hoffman and Kunze. Hoffman and Kunze make no concessions for lazy undergrads, and their prose, although concise, leaves no room to skimmed over. Yes, it can be--and often is--boring. One of the reasons that Hoffman and Kunze is considered so difficult is that it delves straight into theory, unlike many intro Lin Al textbooks which spend much too much time teaching row reduction and leave vector spaces and linear transformations as an afterthought. A necessary pre-requisite is a good knowledge of set theory (vector spaces, after all, are nothing but sets) and the ability to write proofs in general. Other than that, the book is pretty much self-contained. It is divided into 8 chapters, most of which become more theoretical and difficult as they progress. Generally, the chapters themselves become more abstract as they progress, and much of the material later in the book is probably graduate-level material. Each chapter is divided into several sections, most of which are followed by exercises. The exercises are both computational and theoretical, and they range from fairly easy to insanely difficult. The theorems proved in the exercises are interesting and rarely trivial. They all require some thought. As will become evident in the following descriptions, a great thing about Kunze and Hoffman is that it introduces abstract concepts which will be used and developed in higher level math courses. A brief overview:Chapter 1: Linear Equations. Linear algebra is, after all, motivated by systems of linear equations. A novel feature of Hoffman and Kunze is that most of their theorems and proofs generalize the concepts of the real/complex numbers into arbitrary "fields" of "scalars." This is good because it puts the reader into the mindset that will be developed further in a Modern Algebra course. It covers row reduction, RRE matrices, matrix multiplication, and invertible matrices, all in the context of systems of linear equations.Chapter 2: Vector Spaces. Concepts of vector spaces, subspaces, bases, and dimension are introduced.Chapter 3: Linear Transformations. Discusses null space, range, and the algebra of linear transformations. It the brings up discussion of isomorphisms between vector spaces, and spends a lot of time on linear functionals and the double dual, which topics are very theoretical, very useful, and neglected by most intro level textbooks. It also introduces the abstract notion of a "group." A possible con is that it neglects to mention, let alone discuss, the geometrical interpretation of some linear transformations. But this is in keeping with the abstract ethos of the book.(I don’t have much experience with some of the following chapters, so the following descriptions may be terse)Chapter 4: Polynomials. Once again introduces abstract notion, this time of an "algebra." Treats poynomials in depth--including prime factorization.Chapter 5:

Determinants. VERY abstract. Introduces topics such as rings, modules, and Grassman rings.Chapter 6: Elementary Canonical Forms. This chapter starts with a discussion of eigenvalues/spaces of linear operators (confusingly called "characteristic values/spaces" by Kunze and Hoffman) and diagonalizable operators. Much more besides, all of which is heavily theoretical.Chapter 9. Rational and Jordan Forms.Chapter 8. Inner Product Spaces.Chapter 9. Operators on Inner Product Spaces.Chapter 10. Bilinear Forms.By the end my Lin Al II course, I had fallen in love with this book; it caused me to switch my major to Math. Koffman and Hunze develops everything axiomatically, precisely, and gives excellent preparation for the lingo and methods of higher level courses such as Modern Algebra. It is unabashedly meant for Math Majors, and Engineers and Applied Scientists probably would not appreciate Hoffman and Kunze.One problem that I had with this book is that the proofs sometimes seem to gloss over too much. This is probably necessary for purposes of space, and at any rate it ensures that students will actually understand the theorems and their proofs. I would also prefer more exercises, especially theoretical exercises. Otherwise, this is the definitive book on lin al for math majors! According to my prof, it is the reference that all mathematicians consult.

I have used this book as the textbook for a Linear Algebra discipline. It is considered the "reference" for that discipline in my institute. Although it can be considered the bible on the subject it should not be used alone in a first course of that subject, it is definitely not an introductory book. On the other hand, for a trained student or researcher on the subject it is simply one of the best (if not the best).

nice book, came as described. also, seller is professional and cares for customers. they responded to my email. thanks.

Corner was slightly bent but other than that it’s great! and at a good price too! Thank you!

Nice book

As a professor of mathematics, I was recently assigned a section of our undergraduate linear algebra course; the last time I taught the course was twelve years ago. While doing the obligatory search for a course text, I have been surprised to see how the first course in linear algebra for mathematicians and scientists has "evolved" since I last taught it, at least insofar as that evolution is reflected through available and popular textbooks.In one of the more popular linear algebra texts currently on the market (I will refrain from naming it), the formal definition of a vector space does not even occur until page 198, and this is not atypical. Looking through half a dozen of the more popular texts, one finds lengthy introductory chapters on vectors in R^n and their properties, basic matrix algebra, systems of linear equations, special algorithms for computing determinants and matrix inverses in efficient time, and significant space devoted to special matrix factorizations, such as the LU factorization. I would like to point out, without passing judgment, that this has not always been the case. Over time, the undergraduate course in linear algebra for mathematicians and scientists has evidently acquired a partial resemblance to the computational, non-proof-based course in "Matrix Algebra" that used to be offered to "casual users" of this area of mathematics at nearly all major universities.Hoffman and Kunze's book was written for the undergraduate linear algebra course at MIT in the 1960s. Those of us who pursued graduate study in mathematics in the 1970s saw copies of this text, with its vivid purple stripes down the cover, on the shelves of virtually every serious graduate student. Simply put, Hoffman and Kunze was a "standard" undergraduate reference for decades, which continued to inform its readers well into graduate programs or professional careers.The author of this review did not have the good fortune to use Hoffman and Kunze in a course, but I always had a copy at hand as a reference. My first linear algebra course, taken as a sophomore in the 1970s, used a text by Robert Stoll and Edward Wong (Academic Press, 1968). In Stoll and Wong, the definition of a vector space occurs on page 4, not on page 204. There is no preliminary chapter on basic matrix algebra; these computations are discussed as they arise, in context, when one chooses a basis for a vector space and therefore places coordinates on that space. The entire organization and conceptual structure of Stoll and Wong's book is worlds apart from the texts I have been reviewing of late. The same may be said of Hoffman and Kunze, and indeed of most of the popular linear algebra books from that period of time. This is why I am a bit disturbed when I read reviews that declare Hoffman and Kunze's classic text "outdated," "irrelevant," or "impossible to read." If the younger reviewers are comparing Hoffman and Kunze to most of the popular competitors that have been published in the past five years or so, then they are comparing a remnant apple to a crate of newly harvested oranges.Against all odds, Hoffman and Kunze remains in print, 46 years after its first apperance. And this in an era when the typical college text remains in print for what seems like less than five years. There is a reason for this longevity. For serious students of mathematics and the mathematical sciences, this text remains invaluable. If one is going to be called upon to actually USE linear algbra in any substantive way (and by substantive I do not mean inverting a matrix or solving a system of two linear equations in two unknowns), then one eventually must learn about such things as dual spaces and double duals, cyclic decompositions and the Jordan canonical form, unitary operators, self-adjointness, the spectral theorem, and multilinearity and tensors. One cannot even find most of these topics in the most popular undergraduate texts currently available on the market; they appear to reach their summit when they discuss eigenvalues and eigenvectors. As a consequence, if a student in an advanced course in, say, differential geometry or differential equations is sent back to his or her linear algebra text to read about dual spaces or the Jordan canonical form, then it will be necessary to abandon the text with which he/she is familiar and refer to a more serious reference like Hoffman and Kunze. How terribly inefficient.In the spirit of fairness, I must observe that the text Linear Algebra, 4th ed., by Friedberg, Insel and Spence is a currently available undergraduate text that is comparable to Hoffman and Kunze in coverage and rigor. It is an excellent text for a first course for mathematics majors---a true anomaly among a host of weaker competitors. However, the authors may dissuade many would-be users by their declaration in the preface that their text is "especially suited for a second course in linear algebra that emphasizes abstract vector spaces, although it can be used in a first course with a strong theoretical emphasis." The second undergraduate course in linear algebra is evidently becoming increasingly common; is this because the first course has been weakened to "matrix algebra" and therefore leaves the student unprepared to cope with advanced mathematical courses?My sincere thanks go out to Prentice-Hall for keeping Hoffman and Kunze in print all these years. Linear algebra is the essential prerequisite for nearly all advanced mathematics, and it is good to see that at least one definitive reference remains available, even as market and societal forces in higher education bring about a clear, demonstrable devolution in the quality of introductory texts on the subject.

I’ve only started working with this book, but I’m very impressed with the clarity and elegance of the presentation. It is a pleasure to read, and has lots of exercises. I like the pedagogical approach, in which the authors present a specific example on the way to introducing a new concept. (Many authors do the opposite: give a definition and then examples.) Take a look at the beginning of chapter 8 (on inner product spaces) to get an idea.

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