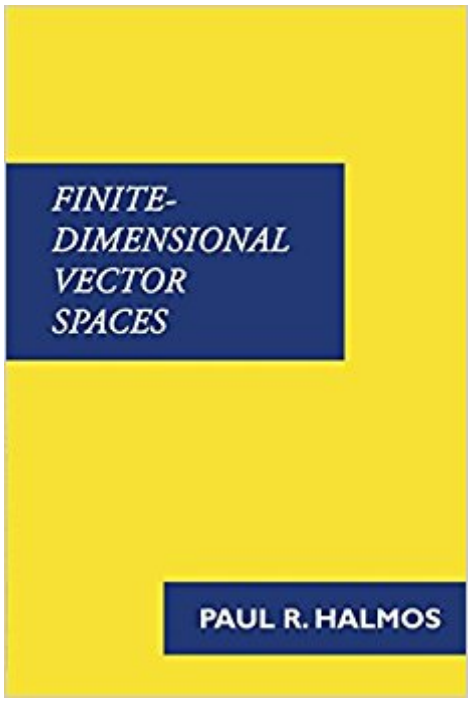
Finite-Dimensional Vector Spaces



Synopsis

Master expositor Paul Halmos presents Linear Algebra in the pure axiomatic spirit. He writes "My purpose in this book is to treat linear transformations on finite dimensional vector spaces by the methods of more general theories. The idea is to emphasize the simple geometric notions common to many parts of mathematics and its applications, and to do so in a language that gives away the trade secrets ...". This text is an ideal supplement to modern treatments of Linear Algebra. "The theory is systematically developed by the axiomatic method that has, since von Neumann, dominated the general approach to linear functional analysis and that achieves here a high degree of lucidity and clarity....The book contains about 350 well placed and instructive problems, which cover a considerable part of the subject. All in all this is an excellent work, of equally high value for both student and teacher." --Zentralblatt fÃƒÂ r Mathematik.

Book Information

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Customer Reviews

Ã¢â ¬Å“This is a classic but still useful introduction to modern linear algebra. It is primarily about linear transformations Ã¢â ¬Â¦ ItÃ¢â ¬â„¢s also extremely well-written and logical, with short and elegant proofs. Ã¢â ¬Â¦ The exercises are very good, and are a mixture of proof questions and concrete examples. The book ends with a few applications to analysis Ã¢â ¬Â¦ and a brief summary of what is needed to extend this theory to Hilbert spaces.Ã¢â ¬Â• (Allen Stenger, MAA Reviews, maa.org, May, 2016)Ã¢â ¬Å“The theory is systematically developed by the axiomatic method that has, since von Neumann, dominated the general approach to linear functional analysis and that

achieves here a high degree of lucidity and clarity. The presentation is never awkward or dry, as it sometimes is in other Ã¢â ¬Å“modernÃ¢â ¬Â• textbooks; it is as unconventional as one has come to expect from the author. The book contains about 350 well placed and instructive problems, which cover a considerable part of the subject. All in all this is an excellent work, of equally high value for both student and teacher.Ã¢â ¬Â• Zentralblatt fÃƒÂ r Mathematik --This text refers to the Hardcover edition.

Halmos's FDVS is a classic undergraduate text. The second edition of this text (1958, Van Nostrand) is an excellent text which deserves five stars.However, the Martino Publishing edition (2012) in question is a reprint of the preliminary 1942 Princeton University Press edition. While of historical value, the typesetting of this text (done in typewriter) makes it a challenge to decipher. For instance, the Script and Fraktur letters are written in by hand!If you are buying this for a class, this is definitely not the edition you are looking for!On the other hand, the 2nd edition, reprinted by Benediction Classics (2015), with ~200 exercises and beautifully typeset (by 1958 standards) is a true gem. Linear algebra (despite the almost trivial first impression it might give you) is a difficult and subtle subject. It's easy to miss these things when most introductory classes treat it as if it is synonymous with the study of matrix algebra and determinants. Despite having an introductory linear algebra course (semirigorous with some technical definitions and proofs) and graduate matrix computation course under my belt, I didn't understand the true nature of the subject until I studied from this book (as part of a real analysis course).The emphasis this text places on the coordinate-free (abstract linear algebra) point of view shows you how a mathematician would think about this elementary and classical subject, in light of its modern generalizations (most notably Banach and Hilbert spaces), which form a large part of functional analysis and the theory of linear operators, in particular. The author's main goal was to draw an analogy between the finite-dimensional theory (the subject of this book) and infinite-dimensional generalizations, of benefit for both novices in terms of their future studies and someone reading the book for review who's already studied the latter.In spite of these praises, this book is admittedly not the most appropriate exposure to higher-level math, though all the proofs are "elementary". Without some appreciation of its applications (either in a pure or applied math setting), the beginner won't see importance of studying linear transformations and subspaces. The most natural setting for learning this material might be during or just before a course in real analysis of several variables. Only then does the importance of linear maps becomes obvious.Compared to its modern competitor, Axler's Linear Algebra Done Right, FDVS assumes some degree of mathematical maturity, whereas Axler

starts by teaching the reader the basics of writing a proof. The newer editions of Axler cater even more to the complete beginner, with a bunch of colors and pretty pictures. (If you need colors and pretty pictures, pure math is probably isn't for you!) Moreover, Axler has this weird obsession against the determinant, a perfectly legitimate coordinate-independent function of a finite-dimensional linear operator, IMHO. And as stated above, I don't think linear algebra is the best setting to introduce mathematical rigor, since it's not a flashy field: it results often appear trivial, boring, or both to the beginner (even though neither claim is actually justifiable on further study.)The other textbook of comparable coverage is Hoffman and Kunze, much longer, because it tries to include and give a balanced presentation of both the computational and coordinate-free approaches. However, it only makes sense to use a long book (>400 pages) covering both approaches when you have the luxury of a year-long course, and there is enough time to do justice to both.tl; dr, for the student with a moderate undergrad abstract math background, FDVS is an enlightening presentation of linear algebra the way a pure mathematician sees it. Though on balance better than its modern counterparts, as a word of warning, some notation and terminology are dated, since the text is almost 60 years old!

I was looking for a book that would help bridge the gap between the linear algebra courses taught in the now typical undergraduate style (think LA for engineers) and the type of finite-dimensional LA that is expected as a prerequisite in upper division analysis and abstract algebra courses. Reading many of the favorable reviews of this book I thought I found that bridge. I was a little disappointed. The tone was perhaps a little too informal and there was still a fairly noticeable abstract-leap from my "LA for engineers" course. There is too much of an assumption by the author that the reader has been exposed to advanced topics in mathematics beyond perhaps a very introductory course in real analysis.I do not think this gap is really a fault of the author, than merely a reflection of the very different direction that the teaching undergraduate mathematics has taken since the author published this book. A much more accessible treatment of finite-dimensional spaces is "Linear Algebra Done Right" by Axler. Axler's book really does a much better job of helping a student of mathematics make the transition from "LA for engineers" to the LA of upper division math courses.

I love this book. It could use more problems, but I went elsewhere(Lang, schaums, etc.)It is to LA as Rudin is to Analysis, or Spivak is to "Calculus on Manifolds"I do love this book for its terseness. The subject is very well described, although I definitely think some subsections have no motivation. Lectures on Linear Algebra, is a good book to supplement for theoretical content.

This text seems to be the progenitor of several of the other texts on my shelf. For example Axler's Linear Algebra Done Right and Lang's Linear Algebra. All these texts take an operator approach to the subject at the beginning. In particular Halmos has written a compact, pictureless treatment of Linear Algebra that is punctuated with thoughtful execises. The text treats Linear Algebra exclusively, with no mention of non-mathematical applications. It easily contains material for 2 quarter courses, or even a full year, if it is augmented with applications from diverse areas. It is an excellent reference for graduates, but I would not recommend it for an undergraduate text unless the audience is mathematically mature.

This book is NOT an introductory linear algebra text. For that seeÃ Â Linear Algebra Done RightÃ Â (assuming the reader is familiar with Boolean algebra and has had a course in discrete mathematics). That said, this book serves as an incredible reference, covering a wide range of topics, and developing the theory without the egregious use of matrices and determinants. The proofs are often different (when given) than the usual proofs given in other texts. The exercises are numerous and instructive, although rarely difficult (that is not to say they won't make you think). Many interesting results are given in exercises rather than the text, and the proofs for most corollaries of main theorems are left to the reader.Downsides: Terse, very little explanation. This is why I recommend (and use) this book as a reference. No solutions (I prefer it this way, but hints would be nice for some of the exercises).Overall: The breadth of the material is simply incredible at such a great price. Halmos is a celebrated mathematician whose style is well worth studying. Perfect for advanced study / general linear algebra reference.

Classic textbook which prepares the young reader for Hilbert space theory. Needless to say, by the quality of it writing, this is a must-have for your library.

Halmos is a great reference for those who know the material. Its a short book but if you just need a reminder of what a certain property is or how to apply a theorem, this will have it. Not necessarily an intuitive approach to Linear algebra though.

the whole book is fantastic. The best is def. of Det , the weakest quotient spaces

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