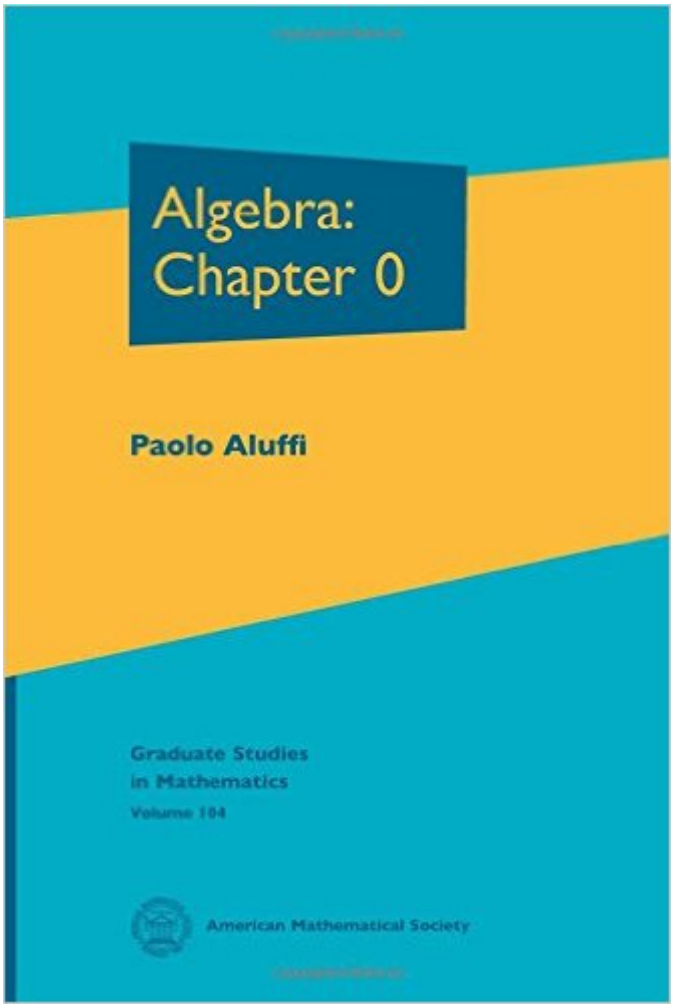
Algebra: Chapter 0 (Graduate Studies In Mathematics)



Synopsis

Algebra: Chapter 0 is a self-contained introduction to the main topics of algebra, suitable for a first sequence on the subject at the beginning graduate or upper undergraduate level. The primary distinguishing feature of the book, compared to standard textbooks in algebra, is the early introduction of categories, used as a unifying theme in the presentation of the main topics. A second feature consists of an emphasis on homological algebra: basic notions on complexes are presented as soon as modules have been introduced, and an extensive last chapter on homological algebra can form the basis for a follow-up introductory course on the subject. Approximately 1,000 exercises both provide adequate practice to consolidate the understanding of the main body of the text and offer the opportunity to explore many other topics, including applications to number theory and algebraic geometry. This will allow instructors to adapt the textbook to their specific choice of topics and provide the independent reader with a richer exposure to algebra. Many exercises include substantial hints, and navigation of the topics is facilitated by an extensive index and by hundreds of cross-references.

Book Information

Series: Graduate Studies in Mathematics
Hardcover: 728 pages
Publisher: American Mathematical Society (August 2, 2009)
Language: English
ISBN-10: 0821847813
ISBN-13: 978-0821847817
Product Dimensions: 1.8 x 7 x 10.2 inches
Shipping Weight: 3.2 pounds (View shipping rates and policies)
Average Customer Review: 4.8 out of 5 starsÂ Â See all reviewsÂ (16 customer reviews)
Best Sellers Rank: #79,437 in Books (See Top 100 in Books) #12 inÂ Books > Science & Math > Mathematics > Pure Mathematics > Algebra > Abstract #789 inÂ Books > Textbooks > Science & Mathematics > Mathematics

Customer Reviews

I should first mention that I, along with about twenty of my fellow first-year mathematics graduate students, scoured this book from beginning to end. We completed nearly every exercise, and discovered a number of errata (there is quite a large list available on the author’s website, but this book shines in spite of it all).I’ve experienced Fraleigh, Artin, Dummit and Foote, and Aluffi’s texts

on abstract algebra. While each has it’s place, I have to say that Aluffi is my favorite. His writing style is phenomenal (and humorously pretentious at times). This text is not intended to be a reference, but instead read from start to finish, and Aluffi monopolizes this to its full effect. The content is spot on for the intended audience. His exercises cover important, relevant topics to important fields I and my fellow graduate students intend to pursue. These include, but are not limited to: algebraic geometry, commutative algebra, homological algebra, and Lie theory.This book is the best I have encountered for transitioning from an elementary understanding of abstract algebra to a mature perspective, backed by the might of category theory. That being said, I can see how the book may go more smoothly if one has had some initial exposure to algebra before Aluffi. This text does an excellent job synthesizing my understanding, but the organization could be confusing for a beginner.My only real disappointment with the book is in the final chapter on homological algebra. By the last two or three sections, the content is almost prohibitively confusing. It could be the case that there are errata that have confused me (indeed, the listed errata on his website sharply fall in this chapter, and I believe it’s because most students don’t get this far).

This is a very good book overall, the author is a great expositor. Most of the book is very elegant in a way that does not sacrifice readability, and he will not hesitate to help parse when it does. My personal opinion is that it is outclassed by Mac Lane and Birkhoff’s "Algebra", but I still wouldn’t have many qualms about recommending the text to someone with suitable maturity wanting to learn the subject.My only real quibbling with the book is how its main feature - the integration of category theory - is handled. I certainly agree that its use is beneficial in this context, but I think delaying the introduction of functors until the second-to-last chapter is a weakness if categories are going to come up as much as they do. He tosses them aside early for a more intuitive "working definition" of universals, which is understandable at first as it could easily be a bit much to take in at the time, but I assume that’s the same reason adjoints are glossed over the way they are when introduced very shortly after functors. I think it would be helpful to just once when proving something is an adjunction prove the naturality part as well as the bijection part, because not doing so somewhat gives the idea that the naturality condition is simply auxiliary. In general, chapter VIII is a weak point in an otherwise very good book, in many ways it just seems like a preview of the following chapter with less substance than anywhere else in the book.I’ll also add as a very minor complaint: the determinant is poorly motivated upon it’s introduction.

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