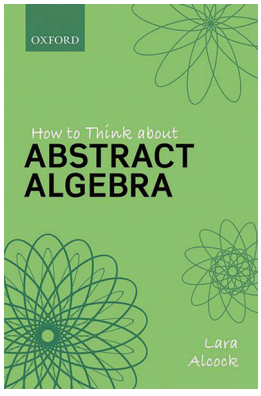
BOOKSHELF

New and Noteworthy Titles on our Bookshelf
May 2022



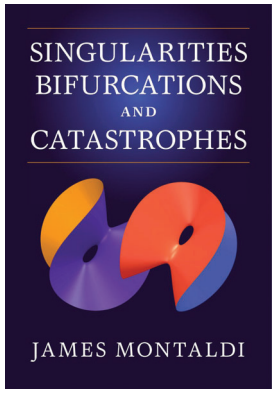
How to Think About Abstract Algebra
By Lara Alcock

This book is a helpful resource to anyone learning or teaching abstract algebra. It prioritizes informality over technical details in a way that makes it more approachable to students struggling with the abstract framework that a course on abstract algebra demands. One way in which it accomplishes this is by including diagrams in each section that can help students to visualize content and build intuition. This book is not intended to be a textbook so it should not be considered as a replacement for whatever text your department normally uses; however, it would be an excellent addition to the 'Recommended Texts' section of any syllabus.

The book is broken into two parts. The first focuses on how to make the shift from computational mathematics to abstract mathematics, and the second develops the abstract algebra the title promises. The author draws upon the same examples throughout the book, allowing the reader to become familiar with them so that they can more easily understand the point that is being made.

It is a great resource for an instructor looking for different or more intuitive ways to explain some core concepts that students tend to struggle with in abstract algebra. The first chapter includes three perspectives from which abstract algebra can be approached: formal, equation oriented, and geometric, and follows each with a brief discussion of the pros and cons the method entails. Each of these approaches are used to explain content throughout the book, although not all approaches are used for every topic.

This book will also be incredibly helpful to students currently taking or preparing to take a course in abstract algebra. It presents an intuitive foundation for the course as well as tips on how to read and write proofs. Some topics covered in this gem include binary operations, groups, homomorphisms, and rings.



Singularities, Bifurcations and Catastrophes
By James Montaldi

Singularities, Bifurcations and Catastrophes is a self-contained book that serves as an introduction to bifurcation theory. It consists of four parts, the last of which contains appendices with background material from linear algebra, multivariate calculus, geometry, ordinary differential equations, and abstract algebra, and solutions to some of the end-of-chapter exercises. The first section can be used for an advanced undergraduate course and material from the second section can be added for a graduate level course. The third part discusses the path approach, ending with examples that highlight the benefits of this method. The book in its entirety can be used for self-study by mathematicians looking to learn more about the field.

This book introduces many of the standard techniques used in singularity theory with a particular focus on applications of bifurcation theory, a subfield of singularity theory. Many equations modeling biological or physical systems (among others) include parameters and often slightly changing the parameters results in a small change in the solutions to the equation. When a slight change in parameters results in a large change in the solution, such as a different number of solutions, a bifurcation has occurred. The text restricts its study to local bifurcations, in which this interesting behavior occurs in arbitrarily small neighborhoods of fixed points or equilibria.

The book includes an introductory chapter that welcomes someone unfamiliar with the field to the content in a reader-friendly manner. Catastrophe theory is the study of bifurcations in dynamical systems and is the topic of the first part of the book. Other topics include finite determinancy, tangent spaces, contact equivalence, the versal unfolding theorem, and the path approach to bifurcation theory. Clear and colorful graphics appear throughout the text to illustrate various singularities.

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