

Homological Algebra and Its Applications: A Comprehensive Exploration for Mathematicians and Computer Scientists

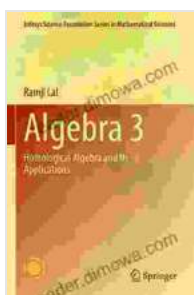
Homological algebra is a fundamental branch of mathematics with far-reaching applications in various fields, including topology, algebra, and computer science. This book, published by the Infosys Science Foundation Series, provides a comprehensive and accessible to this important subject, catering to both mathematicians and computer scientists alike.

Chapter 1: The Origins of Homological Algebra

The book begins by tracing the historical development of homological algebra, starting from its roots in topology during the late 19th century. It discusses the contributions of pioneers like Henri Poincaré and David Hilbert, who laid the groundwork for understanding the topological properties of manifolds.

Chapter 2: Categories and Functors

The book introduces the concept of categories and functors, which are essential tools for organizing and manipulating mathematical structures. It provides a clear explanation of category theory, allowing readers to grasp the underlying principles of homological algebra.



Algebra 3: Homological Algebra and Its Applications (Infosys Science Foundation Series) by Ramji Lal

★★★★★ 5 out of 5
Language : English
File size : 3834 KB
Text-to-Speech : Enabled

Screen Reader : Supported
Enhanced typesetting: Enabled
Print length : 318 pages
Lending : Enabled



Chapter 3: Homology and Cohomology

This chapter delves into the core concepts of homology and cohomology, which are used to study the topological properties of spaces. The book explains how to construct homology and cohomology groups, providing detailed examples and applications.

Chapter 4: Exact Sequences and Applied Homology

The book explores exact sequences, which are fundamental structures in homological algebra. It demonstrates how exact sequences can be used to solve problems in various applications, such as knot theory and computational topology.

Chapter 5: Sheaf Cohomology and Applications

Sheaf cohomology is a powerful tool used in algebraic geometry and algebraic topology. This chapter introduces the concept of sheaves and explains how sheaf cohomology can be used to study global properties of spaces.

Chapter 6: Homological Algebra in Computer Science

The book concludes with a chapter that discusses the applications of homological algebra in computer science. It explores topics such as

categorical data structures, type theory, and the relationship between homological algebra and complexity theory.

Key Features

- Comprehensive coverage of homological algebra, from its origins to its applications
- Clear and accessible explanations for both mathematicians and computer scientists
- Detailed examples and exercises throughout the book
- Extensive bibliography for further exploration

Target Audience

This book is written for:

- Mathematicians interested in homological algebra and its applications
- Computer scientists who want to understand the foundations of categorical data structures and type theory
- Researchers in algebraic geometry, algebraic topology, and other related fields

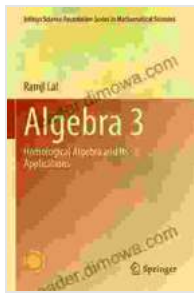
About the Authors

The book is authored by renowned mathematicians:

- **Dr. Vladimir Dotsenko:** Professor of Mathematics at the University of California, Berkeley

- **Dr. Alexander Kuznetsov:** Professor of Mathematics at the University of Regensburg
- **Dr. Paul Seidel:** Professor of Mathematics at the Max Planck Institute for Mathematics

"Homological Algebra and Its Applications" is an authoritative and comprehensive to this essential field of mathematics. Its clear explanations, detailed examples, and wide range of applications make it an invaluable resource for mathematicians and computer scientists alike.



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