

Advanced Modern Algebra Rotman Solutions

Exercises in Modules and Rings
Fields and Galois Theory
Algebraic Topology
Tensor Spaces and Exterior Algebra
An Introduction to Algebraic Topology
A Course in Algebra
Advanced Algebra
Advanced Modern Algebra: Third Edition, Part 2
An Introduction to Algebraic Topology
A Concise Course in Algebraic Topology
Algebraic Geometry
Galois Theory
A First Course in Abstract Algebra
An Introduction to Homological Algebra
Galois Theory
A Concrete Introduction to Higher Algebra
Algebra: Chapter 0
Abstract Algebra
Lattices and Ordered Sets
Learning Modern Algebra
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Lectures on Algebraic Topology
Journey into Mathematics
Modern Algebra
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A First Course in Abstract Algebra
Introductory Modern Algebra
Algebraic Geometry

Exercises in Modules and Rings

This book is the second part of the new edition of Advanced Modern Algebra (the first part published as Graduate Studies in Mathematics, Volume 165). Compared to the previous edition, the material has been significantly reorganized and many sections have been rewritten. The book presents many topics mentioned in the first part in greater depth and in more detail. The five chapters of the book are devoted to group theory, representation theory, homological algebra, categories, and commutative algebra, respectively. The book can be used as a text for a second abstract algebra graduate course, as a source of additional material to a first abstract algebra graduate course, or for self-study.

Fields and Galois Theory

This volume offers a compendium of exercises of varying degree of difficulty in the theory of modules and rings. It is the companion volume to GTM 189. All exercises are solved in full detail. Each section begins with an introduction giving the general background and the theoretical basis for the problems that follow.

Algebraic Topology

Tensor Spaces and Exterior Algebra

An Introduction to Algebraic Topology

Learning Modern Algebra aligns with the CBMS Mathematical Education of Teachers II recommendations, in both content and practice. It emphasizes rings and fields over groups, and it makes explicit connections between the ideas of abstract algebra and the mathematics used by high school teachers. It provides

opportunities for prospective and practicing teachers to experience mathematics for themselves, before the formalities are developed, and it is explicit about the mathematical habits of mind that lie beneath the definitions and theorems. This book is designed for prospective and practicing high school mathematics teachers, but it can serve as a text for standard abstract algebra courses as well. The presentation is organized historically: the Babylonians introduced Pythagorean triples to teach the Pythagorean theorem; these were classified by Diophantus, and eventually this led Fermat to conjecture his Last Theorem. The text shows how much of modern algebra arose in attempts to prove this; it also shows how other important themes in algebra arose from questions related to teaching. Indeed, modern algebra is a very useful tool for teachers, with deep connections to the actual content of high school mathematics, as well as to the mathematics teachers use in their profession that doesn't necessarily "end up on the blackboard." The focus is on number theory, polynomials, and commutative rings. Group theory is introduced near the end of the text to explain why generalizations of the quadratic formula do not exist for polynomials of high degree, allowing the reader to appreciate the more general work of Galois and Abel on roots of polynomials. Results and proofs are motivated with specific examples whenever possible, so that abstractions emerge from concrete experience. Applications range from the theory of repeating decimals to the use of imaginary quadratic fields to construct problems with rational solutions. While such applications are integrated throughout, each chapter also contains a section giving explicit connections between the content of the chapter and high school teaching.

A Course in Algebra

This book is intended to be a thorough introduction to the subject of order and lattices, with an emphasis on the latter. It can be used for a course at the graduate or advanced undergraduate level or for independent study. Prerequisites are kept to a minimum, but an introductory course in abstract algebra is highly recommended, since many of the examples are drawn from this area. This is a book on pure mathematics: I do not discuss the applications of lattice theory to physics, computer science or other disciplines. Lattice theory began in the early 1890s, when Richard Dedekind wanted to know the answer to the following question: Given three subgroups E , F , and G of an abelian group K , what is the largest number of distinct subgroups that can be formed using these subgroups and the operations of intersection and sum (join), as in $E \cap F \cap G$, $E \cap F + G$, $E + F \cap G$, and so on? In lattice-theoretic terms, this is the number of elements in the relatively free modular lattice on three generators. Dedekind [15] answered this question (the answer is $\#$)) and wrote two papers on the subject of lattice theory, but then the subject lay relatively dormant until Garrett Birkhoff, Oystein Ore and others picked it up in the 1930s. Since then, many noted mathematicians have contributed to the subject, including Garrett Birkhoff, Richard Dedekind, Israel Gelfand, George Grätzer, Aleksandr Kurosh, Anatoly Malcev, Oystein Ore, Gian-Carlo Rota, Alfred Tarski and Johnny von Neumann.

Advanced Algebra

Algebraic topology is a basic part of modern mathematics, and some knowledge of this area is indispensable for any advanced work relating to geometry, including

topology itself, differential geometry, algebraic geometry, and Lie groups. This book provides a detailed treatment of algebraic topology both for teachers of the subject and for advanced graduate students in mathematics either specializing in this area or continuing on to other fields. J. Peter May's approach reflects the enormous internal developments within algebraic topology over the past several decades, most of which are largely unknown to mathematicians in other fields. But he also retains the classical presentations of various topics where appropriate. Most chapters end with problems that further explore and refine the concepts presented. The final four chapters provide sketches of substantial areas of algebraic topology that are normally omitted from introductory texts, and the book concludes with a list of suggested readings for those interested in delving further into the field.

Advanced Modern Algebra: Third Edition, Part 2

This is a basic introduction to modern algebra, providing a solid understanding of the axiomatic treatment of groups and then rings, aiming to promote a feeling for the evolutionary and historical development of the subject. It includes problems and fully worked solutions, enabling readers to master the subject rather than simply observing it.

An Introduction to Algebraic Topology

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.

A Concise Course in Algebraic Topology

Algebraic Geometry

Finally a self-contained, one volume, graduate-level algebra text that is readable by the average graduate student and flexible enough to accommodate a wide variety of instructors and course contents. The guiding principle throughout is that the material should be presented as general as possible, consistent with good pedagogy. Therefore it stresses clarity rather than brevity and contains an

extraordinarily large number of illustrative exercises.

Galois Theory

This book is the second part of the new edition of Advanced Modern Algebra (the first part published as Graduate Studies in Mathematics, Volume 165). Compared to the previous edition, the material has been significantly reorganized and many sections have been rewritten. The book presents many topics mentioned in the first part in greater depth and in more detail. The five chapters of the book are devoted to group theory, representation theory, homological algebra, categories, and commutative algebra, respectively. The book can be used as a text for a second abstract algebra graduate course, as a source of additional material to a first abstract algebra graduate course, or for self-study.

A First Course in Abstract Algebra

Praise for the First Edition "Stahl offers the solvability of equations from the historical point of view one of the best books available to support a one-semester introduction to abstract algebra." —CHOICE Introductory Modern Algebra: A Historical Approach, Second Edition presents the evolution of algebra and provides readers with the opportunity to view modern algebra as a consistent movement from concrete problems to abstract principles. With a few pertinent excerpts from the writings of some of the greatest mathematicians, the Second Edition uniquely facilitates the understanding of pivotal algebraic ideas. The author provides a clear, precise, and accessible introduction to modern algebra and also helps to develop a more immediate and well-grounded understanding of how equations lead to permutation groups and what those groups can inform us about such diverse items as multivariate functions and the 15-puzzle. Featuring new sections on topics such as group homomorphisms, the RSA algorithm, complex conjugation, the factorization of real polynomials, and the fundamental theorem of algebra, the Second Edition also includes: An in-depth explanation of the principles and practices of modern algebra in terms of the historical development from the Renaissance solution of the cubic equation to Dedekind's ideals Historical discussions integrated with the development of modern and abstract algebra in addition to many new explicit statements of theorems, definitions, and terminology A new appendix on logic and proofs, sets, functions, and equivalence relations Over 1,000 new examples and multi-level exercises at the end of each section and chapter as well as updated chapter summaries Introductory Modern Algebra: A Historical Approach, Second Edition is an excellent textbook for upper-undergraduate courses in modern and abstract algebra.

An Introduction to Homological Algebra

Algebraic geometry is a fascinating branch of mathematics that combines methods from both, algebra and geometry. It transcends the limited scope of pure algebra by means of geometric construction principles. Moreover, Grothendieck's schemes invented in the late 1950s allowed the application of algebraic-geometric methods in fields that formerly seemed to be far away from geometry, like algebraic number theory. The new techniques paved the way to spectacular progress such as the

proof of Fermat's Last Theorem by Wiles and Taylor. The scheme-theoretic approach to algebraic geometry is explained for non-experts. More advanced readers can use the book to broaden their view on the subject. A separate part deals with the necessary prerequisites from commutative algebra. On a whole, the book provides a very accessible and self-contained introduction to algebraic geometry, up to a quite advanced level. Every chapter of the book is preceded by a motivating introduction with an informal discussion of the contents. Typical examples and an abundance of exercises illustrate each section. This way the book is an excellent solution for learning by yourself or for complementing knowledge that is already present. It can equally be used as a convenient source for courses and seminars or as supplemental literature.

Galois Theory

Algebraic topology is the study of the global properties of spaces by means of algebra. It is an important branch of modern mathematics with a wide degree of applicability to other fields, including geometric topology, differential geometry, functional analysis, differential equations, algebraic geometry, number theory, and theoretical physics. This book provides an introduction to the basic concepts and methods of algebraic topology for the beginner. It presents elements of both homology theory and homotopy theory, and includes various applications. The author's intention is to rely on the geometric approach by appealing to the reader's own intuition to help understanding. The numerous illustrations in the text also serve this purpose. Two features make the text different from the standard literature: first, special attention is given to providing explicit algorithms for calculating the homology groups and for manipulating the fundamental groups. Second, the book contains many exercises, all of which are supplied with hints or solutions. This makes the book suitable for both classroom use and for independent study.

A Concrete Introduction to Higher Algebra

· Group Theory · Ring Theory · Modules and Vector Spaces · Field Theory and Galois Theory · An Introduction to Commutative Rings, Algebraic Geometry, and Homological Algebra · Introduction to the Representation Theory of Finite Groups

Algebra: Chapter 0

J***VERKAUFSKATEGORIE*** 0 e This text offers a clear, efficient exposition of Galois Theory with exercises and complete proofs. Topics include: Cardano's formulas; the Fundamental Theorem; Galois' Great Theorem (solvability for radicals of a polynomial is equivalent to solvability of its Galois Group); and computation of Galois group of cubics and quartics. There are appendices on group theory and on ruler-compass constructions. Developed on the basis of a second-semester graduate algebra course, following a course on group theory, this book will provide a concise introduction to Galois Theory suitable for graduate students, either as a text for a course or for study outside the classroom.

Abstract Algebra

A clear exposition, with exercises, of the basic ideas of algebraic topology. Suitable for a two-semester course at the beginning graduate level, it assumes a knowledge of point set topology and basic algebra. Although categories and functors are introduced early in the text, excessive generality is avoided, and the author explains the geometric or analytic origins of abstract concepts as they are introduced.

Lattices and Ordered Sets

This book is written as a textbook on algebraic topology. The first part covers the material for two introductory courses about homotopy and homology. The second part presents more advanced applications and concepts (duality, characteristic classes, homotopy groups of spheres, bordism). The author recommends starting an introductory course with homotopy theory. For this purpose, classical results are presented with new elementary proofs. Alternatively, one could start more traditionally with singular and axiomatic homology. Additional chapters are devoted to the geometry of manifolds, cell complexes and fibre bundles. A special feature is the rich supply of nearly 500 exercises and problems. Several sections include topics which have not appeared before in textbooks as well as simplified proofs for some important results. Prerequisites are standard point set topology (as recalled in the first chapter), elementary algebraic notions (modules, tensor product), and some terminology from category theory. The aim of the book is to introduce advanced undergraduate and graduate (master's) students to basic tools, concepts and results of algebraic topology. Sufficient background material from geometry and algebra is included.

Learning Modern Algebra

An introduction to abstract algebraic geometry, with the only prerequisites being results from commutative algebra, which are stated as needed, and some elementary topology. More than 400 exercises distributed throughout the book offer specific examples as well as more specialised topics not treated in the main text, while three appendices present brief accounts of some areas of current research. This book can thus be used as textbook for an introductory course in algebraic geometry following a basic graduate course in algebra. Robin Hartshorne studied algebraic geometry with Oscar Zariski and David Mumford at Harvard, and with J.-P. Serre and A. Grothendieck in Paris. He is the author of "Residues and Duality", "Foundations of Projective Geometry", "Ample Subvarieties of Algebraic Varieties", and numerous research titles.

A Book of Abstract Algebra

Abstract Algebra

This book covers an especially broad range of topics, including some topics not generally found in linear algebra books. The first part details the basics of linear algebra. Coverage then proceeds to a discussion of modules, emphasizing a comparison with vector spaces. A thorough discussion of inner product spaces,

eigenvalues, eigenvectors, and finite dimensional spectral theory follows, culminating in the finite dimensional spectral theorem for normal operators.

Lectures on Algebraic Topology

Galois theory is a mature mathematical subject of particular beauty. Any Galois theory book written nowadays bears a great debt to Emil Artin's classic text "Galois Theory," and this book is no exception. While Artin's book pioneered an approach to Galois theory that relies heavily on linear algebra, this book's author takes the linear algebra emphasis even further. This special approach to the subject together with the clarity of its presentation, as well as the choice of topics covered, makes this book a more than worthwhile addition to the existing literature on Galois Theory. It will be appreciated by undergraduate and beginning graduate math majors.

Journey into Mathematics

The landscape of homological algebra has evolved over the last half-century into a fundamental tool for the working mathematician. This book provides a unified account of homological algebra as it exists today. The historical connection with topology, regular local rings, and semi-simple Lie algebras are also described. This book is suitable for second or third year graduate students. The first half of the book takes as its subject the canonical topics in homological algebra: derived functors, Tor and Ext, projective dimensions and spectral sequences. Homology of group and Lie algebras illustrate these topics. Intermingled are less canonical topics, such as the derived inverse limit functor \lim^1 , local cohomology, Galois cohomology, and affine Lie algebras. The last part of the book covers less traditional topics that are a vital part of the modern homological toolkit: simplicial methods, Hochschild and cyclic homology, derived categories and total derived functors. By making these tools more accessible, the book helps to break down the technological barrier between experts and casual users of homological algebra.

Modern Algebra

This self-contained treatment begins with three chapters on the basics of point-set topology, after which it proceeds to homology groups and continuous mapping, barycentric subdivision, and simplicial complexes. 1961 edition.

Adventures in Group Theory

CONTEMPORARY ABSTRACT ALGEBRA, EIGHTH EDITION provides a solid introduction to the traditional topics in abstract algebra while conveying to students that it is a contemporary subject used daily by working mathematicians, computer scientists, physicists, and chemists. The text includes numerous figures, tables, photographs, charts, biographies, computer exercises, and suggested readings giving the subject a current feel which makes the content interesting and relevant for students. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Algebra

Accessible but rigorous, this outstanding text encompasses all of the topics covered by a typical course in elementary abstract algebra. Its easy-to-read treatment offers an intuitive approach, featuring informal discussions followed by thematically arranged exercises. This second edition features additional exercises to improve student familiarity with applications. 1990 edition.

Advanced Linear Algebra

A modern and student-friendly introduction to this popular subject: it takes a more "natural" approach and develops the theory at a gentle pace with an emphasis on clear explanations. Features plenty of worked examples and exercises, complete with full solutions, to encourage independent study. Previous books by Howie in the SUMS series have attracted excellent reviews.

An Introduction to Homological Algebra

An informal and readable introduction to higher algebra at the post-calculus level. The concepts of ring and field are introduced through study of the familiar examples of the integers and polynomials, with much emphasis placed on congruence classes leading the way to finite groups and finite fields. New examples and theory are integrated in a well-motivated fashion and made relevant by many applications -- to cryptography, coding, integration, history of mathematics, and especially to elementary and computational number theory. The later chapters include expositions of Rabin's probabilistic primality test, quadratic reciprocity, and the classification of finite fields. Over 900 exercises, ranging from routine examples to extensions of theory, are scattered throughout the book, with hints and answers for many of them included in an appendix.

Abstract Algebra, 2Nd Ed

A completely reworked new edition of this superb textbook. This key work is geared to the needs of the graduate student. It covers, with proofs, the usual major branches of groups, rings, fields, and modules. Its inclusive approach means that all of the necessary areas are explored, while the level of detail is ideal for the intended readership. The text tries to promote the conceptual understanding of algebra as a whole, doing so with a masterful grasp of methodology. Despite the abstract subject matter, the author includes a careful selection of important examples, together with a detailed elaboration of the more sophisticated, abstract theories.

Abstract Algebra

Clearly presented discussions of fields, vector spaces, homogeneous linear equations, extension fields, polynomials, algebraic elements, as well as sections on solvable groups, permutation groups, solution of equations by radicals, and other concepts. 1966 edition.

Galois Theory

as a student." --Book Jacket.

Groups, Rings and Fields

This treatment covers the mechanics of writing proofs, the area and circumference of circles, and complex numbers and their application to real numbers. 1998 edition.

Contemporary Abstract Algebra

This book introduces the reader to modern algebraic geometry. It presents Grothendieck's technically demanding language of schemes that is the basis of the most important developments in the last fifty years within this area. A systematic treatment and motivation of the theory is emphasized, using concrete examples to illustrate its usefulness. Several examples from the realm of Hilbert modular surfaces and of determinantal varieties are used methodically to discuss the covered techniques. Thus the reader experiences that the further development of the theory yields an ever better understanding of these fascinating objects. The text is complemented by many exercises that serve to check the comprehension of the text, treat further examples, or give an outlook on further results. The volume at hand is an introduction to schemes. To get started, it requires only basic knowledge in abstract algebra and topology. Essential facts from commutative algebra are assembled in an appendix. It will be complemented by a second volume on the cohomology of schemes.

Algebra

This book explains, as clearly as possible, tensors and such related topics as tensor products of vector spaces, tensor algebras, and exterior algebras. You will appreciate Yokonuma's lucid and methodical treatment of the subject. This book is useful in undergraduate and graduate courses in multilinear algebra. Tensor Spaces and Exterior Algebra begins with basic notions associated with tensors. To facilitate understanding of the definitions, Yokonuma often presents two or more different ways of describing one object. Next, the properties and applications of tensors are developed, including the classical definition of tensors and the description of relative tensors. Also discussed are the algebraic foundations of tensor calculus and applications of exterior algebra to determinants and to geometry. This book closes with an examination of algebraic systems with bilinear multiplication. In particular, Yokonuma discusses the theory of replicas of Chevalley and several properties of Lie algebras deduced from them.

Advanced Modern Algebra: Third Edition, Part 2

Graduate mathematics students will find this book an easy-to-follow, step-by-step guide to the subject. Rotman's book gives a treatment of homological algebra which approaches the subject in terms of its origins in algebraic topology. In this new edition the book has been updated and revised throughout and new material

on sheaves and cup products has been added. The author has also included material about homotopical algebra, alias K-theory. Learning homological algebra is a two-stage affair. First, one must learn the language of Ext and Tor. Second, one must be able to compute these things with spectral sequences. Here is a work that combines the two.

Algebraic Geometry and Commutative Algebra

This spectacularly clear introduction to abstract algebra is designed to make the study of all required topics and the reading and writing of proofs both accessible and enjoyable for readers encountering the subject for the first time. Number Theory. Groups. Commutative Rings. Modules. Algebras. Principal Idea Domains. Group Theory II. Polynomials In Several Variables. For anyone interested in learning abstract algebra.

A First Course in Abstract Algebra

Basic Algebra and Advanced Algebra systematically develop concepts and tools in algebra that are vital to every mathematician, whether pure or applied, aspiring or established. Advanced Algebra includes chapters on modern algebra which treat various topics in commutative and noncommutative algebra and provide introductions to the theory of associative algebras, homological algebras, algebraic number theory, and algebraic geometry. Many examples and hundreds of problems are included, along with hints or complete solutions for most of the problems. Together the two books give the reader a global view of algebra and its role in mathematics as a whole.

Introductory Modern Algebra

Great book! The author's teaching experience shows in every chapter. --Efim Zelmanov, University of California, San Diego Vinberg has written an algebra book that is excellent, both as a classroom text or for self-study. It is plain that years of teaching abstract algebra have enabled him to say the right thing at the right time. --Irving Kaplansky, MSRI This is a comprehensive text on modern algebra written for advanced undergraduate and basic graduate algebra classes. The book is based on courses taught by the author at the Mechanics and Mathematics Department of Moscow State University and at the Mathematical College of the Independent University of Moscow. The unique feature of the book is that it contains almost no technically difficult proofs. Following his point of view on mathematics, the author tried, whenever possible, to replace calculations and difficult deductions with conceptual proofs and to associate geometric images to algebraic objects. Another important feature is that the book presents most of the topics on several levels, allowing the student to move smoothly from initial acquaintance to thorough study and deeper understanding of the subject. Presented are basic topics in algebra such as algebraic structures, linear algebra, polynomials, groups, as well as more advanced topics like affine and projective spaces, tensor algebra, Galois theory, Lie groups, associative algebras and their representations. Some applications of linear algebra and group theory to physics are discussed. Written with extreme care and supplied with more than 200

exercises and 70 figures, the book is also an excellent text for independent study.

Algebraic Geometry

David Joyner uses mathematical toys such as the Rubik's Cube to make abstract algebra and group theory fun. This updated second edition uses SAGE, an open-source computer algebra system, to illustrate many of the computations.

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