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Approximations and Endomorphism Algebras of Modules - Rüdiger Göbel 2012-10-01

This monograph - now in its second revised and extended edition - provides a thorough treatment of module theory, a subfield of algebra. The authors develop an approximation theory as well as realization theorems and present some of its recent applications, notably to infinite-dimensional combinatorics and model theory. The book starts from basic facts and gradually develops the theory towards its present frontiers.

Handbook of Algebra - M. Hazewinkel 2008-03-06

Algebra, as we know it today, consists of many different ideas, concepts and results. A reasonable estimate of the number of these different items would be somewhere between 50,000 and 200,000. Many of these have been named and many more could (and perhaps should) have a name or a convenient designation. Even the nonspecialist is likely to encounter most of these, either somewhere in the literature, disguised as a definition or a theorem or to hear about them and feel the need for more information. If this happens, one should be able to find enough information in this Handbook to judge if it is worthwhile to pursue the quest. In addition to the primary information given in the Handbook, there are references to relevant articles, books or lecture notes to help the reader. An excellent index has been included which is extensive and not limited to definitions, theorems etc. The Handbook of Algebra will publish articles as they are received and thus the reader will find in this third volume articles from twelve different sections. The advantages of this scheme are two-fold: accepted articles will be published quickly and the outline of the Handbook can be allowed to evolve as the various volumes are published. A particularly important function of the Handbook is to provide professional mathematicians working in an area other than their own with sufficient information on the topic in question if and when it is needed. - Thorough and practical source of information - Provides in-depth coverage of new topics in algebra - Includes references to relevant articles, books and lecture notes

Introduction To Commutative Algebra - Michael Atiyah 2018-03-09

First Published in 2018. Routledge is an imprint of Taylor & Francis, an Informa company.

An Introduction to Rings and Modules J. Berrick 2000-05

This is a concise 2000 introduction at graduate level to ring theory, module theory and number theory.

Algebra - Serge Lang 1978

Exercises in Modules and Rings - T.Y. Lam 2009-12-08

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.

Integral Closure of Ideals, Rings, and Modules Huneke 2006-10-12

Ideal for graduate students and researchers, this book presents a unified treatment of the central notions of integral closure.

A First Course in Noncommutative Rings T.Y. Lam 2012-12-06

One of my favorite graduate courses at Berkeley is Math 251, a one-semester course in ring theory offered to second-year level graduate students. I taught this course in the Fall of 1983, and more recently in the

Spring of 1990, both times focusing on the theory of noncommutative rings. This book is an outgrowth of my lectures in these two courses, and is intended for use by instructors and graduate students in a similar one-semester course in basic ring theory. Ring theory is a subject of central importance in algebra. Historically, some of the major discoveries in ring theory have helped shape the course of development of modern abstract algebra. Today, ring theory is a fertile meeting ground for group theory (group rings), representation theory (modules), functional analysis (operator algebras), Lie theory (enveloping algebras), algebraic geometry (finitely generated algebras, differential operators, invariant theory), arithmetic (orders, Brauer groups), universal algebra (varieties of rings), and homological algebra (cohomology of rings, projective modules, Grothendieck and higher K-groups). In view of these basic connections between ring theory and other branches of mathematics, it is perhaps no exaggeration to say that a course in ring theory is an indispensable part of the education for any fledgling algebraist. The purpose of my lectures was to give a general introduction to the theory of rings, building on what the students have learned from a standard first-year graduate course in abstract algebra.

Model Theoretic Algebra With Particular Emphasis on Fields, Rings, Modules - Christian.U Jensen 2022-03-11

This volume highlights the links between model theory and algebra. The work contains a definitive account of algebraically compact modules, a topic of central importance for both module and model theory. Using concrete examples, particular emphasis is given to model theoretic concepts, such as axiomizability. Pure mathematicians, especially algebraists, ring theorists, logicians, model theorists and representation theorists, should find this an absorbing and stimulating book.

Ideals and Realities Friedrich Ischebeck 2006-03-30

Besides giving an introduction to Commutative Algebra - the theory of commutative rings - this book is devoted to the study of projective modules and the minimal number of generators of modules and ideals. The notion of a module over a ring R is a generalization of that of a vector space over a field k . The axioms are identical. But whereas every vector space possesses a basis, a module need not always have one. Modules possessing a basis are called free. So a finitely generated free R -module is of the form R^n for some $n \in \mathbb{N}$, equipped with the usual operations. A module is called projective, iff it is a direct summand of a free one. Especially a finitely generated R -module P is projective iff there is an R -module Q with $P \oplus Q \cong R^n$ for some n . Remarkably enough there do exist nonfree projective modules. Even there are nonfree P such that $P \oplus R^m \cong R^n$ for some m and n . Modules P having the latter property are called stably free. On the other hand there are many rings, all of whose projective modules are free, e. g. local rings and principal ideal domains. (A commutative ring is called local iff it has exactly one maximal ideal.) For two decades it was a challenging problem whether every projective module over the polynomial ring $k[X_1, \dots]$

Modules and Rings - John Dauns 1994-10-28

This book on modern module and non-commutative ring theory is ideal for beginning graduate students. It starts at the foundations of the subject and progresses rapidly through the basic concepts to help the reader reach current research frontiers. Students will have the chance to develop proofs, solve problems, and to find interesting questions. The first half of the book is concerned with free, projective, and injective modules, tensor algebras, simple modules and primitive rings, the Jacobson radical, and subdirect products.

Later in the book, more advanced topics, such as hereditary rings, categories and functors, flat modules, and purity are introduced. These later chapters will also prove a useful reference for researchers in non-commutative ring theory. Enough background material (including detailed proofs) is supplied to give the student a firm grounding in the subject.

Algebras, Rings and Modules Michiel Hazewinkel 2011-01-29

Associative rings and algebras are very interesting algebraic structures. In a strict sense, the theory of algebras (in particular, noncommutative algebras) originated from a single example, namely the quaternions, created by Sir William R. Hamilton in 1843.

This was the first example of a noncommutative "numbers system". During the next forty years mathematicians introduced other examples of noncommutative algebras, began to bring some order into them and to single out certain types of algebras for special attention. Thus, low-dimensional algebras, division algebras, and commutative algebras, were classified and characterized. The first complete results in the structure theory of associative algebras over the real and complex fields were obtained by T. Molien, E. Cartan and G. Frobenius. Modern ring theory began when J. H. Wedderburn proved his celebrated classification theorem for finite dimensional semisimple algebras over arbitrary fields. Twenty years later, E. Artin proved a structure theorem for rings satisfying both the ascending and descending chain condition which generalized Wedderburn structure theorem. The Wedderburn-Artin theorem has since become a cornerstone of noncommutative ring theory. The purpose of this book is to introduce the subject of the structure theory of associative rings. This book is addressed to a reader who wishes to learn this topic from the beginning to research level. We have tried to write a self-contained book which is intended to be a modern textbook on the structure theory of associative rings and related structures and will be accessible for independent study.

Lectures on Modules and Rings - Tsit-Yuen Lam 2012-12-06

This new book can be read independently from the first volume and may be used for lecturing, seminar- and self-study, or for general reference. It focuses more on specific topics in order to introduce readers to a wealth of basic and useful ideas without the hindrance of heavy machinery or undue abstractions. User-friendly with its abundance of examples illustrating the theory at virtually every step, the volume contains a large number of carefully chosen exercises to provide newcomers with practice, while offering a rich additional source of information to experts. A direct approach is used in order to present the material in an efficient and economic way, thereby introducing readers to a considerable amount of interesting ring theory without being dragged through endless preparatory material.

An Introduction to Noncommutative Noetherian Rings - K. R. Goodearl 2004-07-12

This introduction to noncommutative noetherian rings is intended to be accessible to anyone with a basic background in abstract algebra. It can be used as a second-year graduate text, or as a self-contained reference. Extensive explanatory discussion is given, and exercises are integrated throughout. This edition incorporates substantial revisions, particularly in the first third of the book, where the presentation has been changed to increase accessibility and topicality. New material includes the basic types of quantum groups, which then serve as test cases for the theory developed.

Foundations of Commutative Rings and Their Modules Bangui Wang 2017-01-06

This book provides an introduction to the basics and recent developments of commutative algebra. A glance at the contents of the first five chapters shows that the topics covered are ones that usually are included in any commutative algebra text. However, the contents of this book differ significantly from most commutative algebra texts: namely, its treatment of the Dedekind-Mertens formula, the (small) finitistic dimension of a ring, Gorenstein rings, valuation overrings and the valuative dimension, and Nagata rings. Going further, Chapter 6 presents w -modules over commutative rings as they can be most commonly used by torsion theory and multiplicative ideal theory. Chapter 7 deals with multiplicative ideal theory over integral domains. Chapter 8 collects various results of the pullbacks, especially Milnor squares and $D+M$ constructions, which are probably the most important example-generating machines. In Chapter 9, coherent rings with finite weak global dimensions are probed, and the local ring of weak global dimension two is elaborated on by combining homological tricks and methods of star operation theory. Chapter 10 is devoted to the Grothendieck group of a commutative ring. In particular, the Bass-Quillen problem is

discussed. Finally, Chapter 11 aims to introduce relative homological algebra, especially where the related concepts of integral domains which appear in classical ideal theory are defined and investigated by using the class of Gorenstein projective modules. Each section of the book is followed by a selection of exercises of varying degrees of difficulty. This book will appeal to a wide readership from graduate students to academic researchers who are interested in studying commutative algebra.

Topics in Hyperplane Arrangements - Marcelo Aguiar 2017-11-22

This monograph studies the interplay between various algebraic, geometric and combinatorial aspects of real hyperplane arrangements. It provides a careful, organized and unified treatment of several recent developments in the field, and brings forth many new ideas and results. It has two parts, each divided into eight chapters, and five appendices with background material. Part I gives a detailed discussion on faces, flats, chambers, cones, gallery intervals, lunes and other geometric notions associated with arrangements. The Tits monoid plays a central role. Another important object is the category of lunes which generalizes the classical associative operad. Also discussed are the descent and lune identities, distance functions on chambers, and the combinatorics of the braid arrangement and related examples. Part II studies the structure and representation theory of the Tits algebra of an arrangement. It gives a detailed analysis of idempotents and Peirce decompositions, and connects them to the classical theory of Eulerian idempotents. It introduces the space of Lie elements of an arrangement which generalizes the classical Lie operad. This space is the last nonzero power of the radical of the Tits algebra. It is also the socle of the left ideal of chambers and of the right ideal of Lie elements. Lie elements generalize the classical Lie idempotents. They include Dynkin elements associated to generic half-spaces which generalize the classical Dynkin idempotent. Another important object is the lune-incidence algebra which marks the beginning of noncommutative Möbius theory. These ideas are also brought upon the study of the Solomon descent algebra. The monograph is written with clarity and in sufficient detail to make it accessible to graduate students. It can also serve as a useful reference to experts.

Ring and Module Theory - Toma Albu 2011-02-04

This book is a collection of invited papers and articles, many presented at the 2008 International Conference on Ring and Module Theory. The papers explore the latest in various areas of algebra, including ring theory, module theory and commutative algebra.

Rings and Categories of Modules - Frank W. Anderson 2012-12-06

This book is intended to provide a reasonably self-contained account of a major portion of the general theory of rings and modules suitable as a text for introductory and more advanced graduate courses. We assume the familiarity with rings usually acquired in standard undergraduate algebra courses. Our general approach is categorical rather than arithmetical. The continuing theme of the text is the study of the relationship between the one-sided ideal structure that a ring may possess and the behavior of its categories of modules. Following a brief outline of set-theoretic and categorical foundations, the text begins with the basic definitions and properties of rings, modules and homomorphisms and ranges through comprehensive treatments of direct sums, finiteness conditions, the Wedderburn-Artin Theorem, the Jacobson radical, the hom and tensor functions, Morita equivalence and duality, decomposition theory of injective and projective modules, and semi perfect and perfect rings. In this second edition we have included a chapter containing many of the classical results on artinian rings that have helped to form the foundation for much of the contemporary research on the representation theory of artinian rings and finite dimensional algebras. Both to illustrate the text and to extend it we have included a substantial number of exercises covering a wide spectrum of difficulty. There are, of course many important areas of ring and module theory that the text does not touch upon.

Noncommutative Noetherian Rings - John C. McConnell 2001

This is an updated edition of a work that was considered the definitive account in the subject area upon its initial publication by J. Wiley & Sons in 1987. It presents, within a wider context, a comprehensive account of noncommutative Noetherian rings. The author covers the major developments from the 1950s, stemming from Goldie's theorem and onward, including applications to group rings, enveloping algebras of Lie algebras, PI rings, differential operators, and localization theory. The book is not restricted to Noetherian rings, but discusses wider classes of rings where the methods apply more generally. In the current edition,

some errors were corrected, a number of arguments have been expanded, and the references were brought up to date. This reprinted edition will continue to be a valuable and stimulating work for readers interested in ring theory and its applications to other areas of mathematics.

Constructive Commutative Algebra - Ihsen Yengui 2015-12-11

The main goal of this book is to find the constructive content hidden in abstract proofs of concrete theorems in Commutative Algebra, especially in well-known theorems concerning projective modules over polynomial rings (mainly the Quillen-Suslin theorem) and syzygies of multivariate polynomials with coefficients in a valuation ring. Simple and constructive proofs of some results in the theory of projective modules over polynomial rings are also given, and light is cast upon recent progress on the Hermite ring and Gröbner ring conjectures. New conjectures on unimodular completion arising from our constructive approach to the unimodular completion problem are presented. Constructive algebra can be understood as a first preprocessing step for computer algebra that leads to the discovery of general algorithms, even if they are sometimes not efficient. From a logical point of view, the dynamical evaluation gives a constructive substitute for two highly nonconstructive tools of abstract algebra: the Law of Excluded Middle and Zorn's Lemma. For instance, these tools are required in order to construct the complete prime factorization of an ideal in a Dedekind ring, whereas the dynamical method reveals the computational content of this construction. These lecture notes follow this dynamical philosophy.

Foundations of Module and Ring Theory - Robert Wisbauer 2018-05-11

This volume provides a comprehensive introduction to module theory and the related part of ring theory, including original results as well as the most recent work. It is a useful and stimulating study for those new to the subject as well as for researchers and serves as a reference volume. Starting from a basic understanding of linear algebra, the theory is presented and accompanied by complete proofs. For a module M , the smallest Grothendieck category containing it is denoted by $\mathcal{O}[M]$ and module theory is developed in this category. Developing the techniques in $\mathcal{O}[M]$ is no more complicated than in full module categories and the higher generality yields significant advantages: for example, module theory may be developed for rings without units and also for non-associative rings. Numerous exercises are included in this volume to give further insight into the topics covered and to draw attention to related results in the literature.

Linear Algebra over Commutative Rings - Bernard R. McDonald 2020-11-26

This monograph arose from lectures at the University of Oklahoma on topics related to linear algebra over commutative rings. It provides an introduction of matrix theory over commutative rings. The monograph discusses the structure theory of a projective module.

Lectures on Rings and Modules - Joachim Lambek 1966

Rings and Things and a Fine Array of Twentieth Century Associative Algebra - Carl Clifton Faith 2004

This book surveys more than 125 years of aspects of associative algebras, especially ring and module theory. It is the first to probe so extensively such a wealth of historical development. Moreover, the author brings the reader up to date, in particular through his report on the subject in the second half of the twentieth century. In the second part of the book, the author gives descriptive impressions of the last half of the twentieth century. Beginning with his teachers and fellow graduate students at the University of Kentucky and at Purdue, Faith discusses his Fulbright-NATO Postdoctoral at Heidelberg and at the Institute for Advanced Study at Princeton, his year as a visiting scholar at Berkeley, and the many acquaintances he met there and in subsequent travels in India, Europe, and most recently, Barcelona.

Rings, Polynomials, and Modules - Marco Fontana 2017-11-11

This volume presents a collection of articles highlighting recent developments in commutative algebra and related non-commutative generalizations. It also includes an extensive bibliography and lists a substantial number of open problems that point to future directions of research in the represented subfields. The contributions cover areas in commutative algebra that have flourished in the last few decades and are not yet well represented in book form. Highlighted topics and research methods include Noetherian and non-Noetherian ring theory, module theory and integer-valued polynomials along with connections to algebraic

number theory, algebraic geometry, topology and homological algebra. Most of the eighteen contributions are authored by attendees of the two conferences in commutative algebra that were held in the summer of 2016: "Recent Advances in Commutative Ring and Module Theory," Bressanone, Italy; "Conference on Rings and Polynomials" Graz, Austria. There is also a small collection of invited articles authored by experts in the area who could not attend either of the conferences. Following the model of the talks given at these conferences, the volume contains a number of comprehensive survey papers along with related research articles featuring recent results that have not yet been published elsewhere.

Algebras, Rings and Modules - Michiel Hazewinkel 2016-04-05

The theory of algebras, rings, and modules is one of the fundamental domains of modern mathematics. General algebra, more specifically non-commutative algebra, is poised for major advances in the twenty-first century (together with and in interaction with combinatorics), just as topology, analysis, and probability experienced in the twentieth century. This volume is a continuation and an in-depth study, stressing the non-commutative nature of the first two volumes of *Algebras, Rings and Modules* by M. Hazewinkel, N. Gubareni, and V. V. Kirichenko. It is largely independent of the other volumes. The relevant constructions and results from earlier volumes have been presented in this volume.

Classic Algebra - P. M. Cohn 2000-12-19

Fundamental to all areas of mathematics, algebra provides the cornerstone for the student's development. The concepts are often intuitive, but some can take years of study to absorb fully. For over twenty years, the author's classic three-volume set, *Algebra*, has been regarded by many as the most outstanding introductory work available. This work, *Classic Algebra*, combines a fully updated Volume 1 with the essential topics from Volumes 2 and 3, and provides a self-contained introduction to the subject. In addition to the basic concepts, advanced material is introduced, giving the reader an insight into more advanced algebraic topics. The clear presentation style gives this book the edge over others on the subject.

Undergraduates studying first courses in algebra will benefit from the clear exposition and perfect balance of theory, examples and exercises. The book provides a good basis for those studying more advanced algebra courses. Complete and rigorous coverage of the important basic concepts. Topics covered include sets, mappings, groups, matrices, vector spaces, fields, rings and modules. Written in a lucid style, with each concept carefully explained. Introduces more advanced topics and suggestions for further reading. Contains over 800 exercises, including many solutions. "There is no better textbook on algebra than the volumes by Cohn." - Walter Benz, Universität Hamburg, Germany

Separable Algebras - Timothy J. Ford 2017-09-26

This book presents a comprehensive introduction to the theory of separable algebras over commutative rings. After a thorough introduction to the general theory, the fundamental roles played by separable algebras are explored. For example, Azumaya algebras, the henselization of local rings, and Galois theory are rigorously introduced and treated. Interwoven throughout these applications is the important notion of étale algebras. Essential connections are drawn between the theory of separable algebras and Morita theory, the theory of faithfully flat descent, cohomology, derivations, differentials, reflexive lattices, maximal orders, and class groups. The text is accessible to graduate students who have finished a first course in algebra, and it includes necessary foundational material, useful exercises, and many nontrivial examples.

Rings, Modules, Algebras, and Abelian Groups - Alberto Facchini 2020-02-10

Rings, Modules, Algebras, and Abelian Groups summarizes the proceedings of a recent algebraic conference held at Venice International University in Italy. Surveying the most influential developments in the field, this reference reviews the latest research on Abelian groups, algebras and their representations, module and ring theory, and topological

Algebras, Rings, and Modules - Michiel Hazewinkel 2010

The main goal of this book is to present an introduction to and applications of the theory of Hopf algebras. The authors also discuss some important aspects of the theory of Lie algebras. The first chapter can be viewed as a primer on Lie algebras, with the main goal to explain and prove the Gabriel-Bernstein-Gelfand-Ponomarev theorem on the correspondence between the representations of Lie algebras and quivers; this material has not previously appeared in book form. The next two chapters are also "primers" on

coalgebras and Hopf algebras, respectively; they aim specifically to give sufficient background on these topics for use in the main part of the book. Chapters 4-7 are devoted to four of the most beautiful Hopf algebras currently known: the Hopf algebra of symmetric functions, the Hopf algebra of representations of the symmetric groups (although these two are isomorphic, they are very different in the aspects they bring to the forefront), the Hopf algebras of the nonsymmetric and quasisymmetric functions (these two are dual and both generalize the previous two), and the Hopf algebra of permutations. The last chapter is a survey of applications of Hopf algebras in many varied parts of mathematics and physics. Unique features of the book include a new way to introduce Hopf algebras and coalgebras, an extensive discussion of the many universal properties of the functor of the Witt vectors, a thorough discussion of duality aspects of all the Hopf algebras mentioned, emphasis on the combinatorial aspects of Hopf algebras, and a survey of applications already mentioned. The book also contains an extensive (more than 700 entries) bibliography. The main goal of this book is to present an introduction to and applications of the theory of Hopf algebras. The authors also discuss some important aspects of the theory of Lie algebras. The first chapter can be viewed as a primer on Lie algebras, with the main goal to explain and prove the Gabriel-Bernstein-Gelfand-Ponomarev theorem on the correspondence between the representations of Lie algebras and quivers; this material has not previously appeared in book form. The next two chapters are also ""primers"" on coalgebras and Hopf algebras, respectively; they aim specifically to give sufficient background on these topics for use in the main part of the book. Chapters 4-7 are devoted to four of the most beautiful Hopf algebras currently known: the Hopf algebra of symmetric functions, the Hopf algebra of representations of the symmetric groups (although these two are isomorphic, they are very different in the aspects they bring to the forefront), the Hopf algebras of the nonsymmetric and quasisymmetric functions (these two are dual and both generalize the previous two), and the Hopf algebra of permutations. The last chapter is a survey of applications of Hopf algebras in many varied parts of mathematics and physics. Unique features of the book include a new way to introduce Hopf algebras and coalgebras, an extensive discussion of the many universal properties of the functor of the Witt vectors, a thorough discussion of duality aspects of all the Hopf algebras mentioned, emphasis on the combinatorial aspects of Hopf algebras, and a survey of applications already mentioned. The book also contains an extensive (more than 700 entries) bibliography.

Rings and Their Modules - Paul E. Bland 2011

This book is an introduction to the theory of rings and modules that goes beyond what one normally obtains in a graduate course in abstract algebra. In addition to the presentation of standard topics in ring and module theory, it also covers category theory, homological algebra and even more specialized topics like injective envelopes and proj

Rings, Modules and Linear Algebra - Hartley 1970

Steps in Commutative Algebra - Rodney Y. Sharp 2000

Introductory account of commutative algebra, aimed at students with a background in basic algebra.

Exercises in Modules and Rings - T.Y. Lam 2006-12-15

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. Groups, Rings And Modules With Applications - M.R. Adhikari 2003

Algebras, Rings and Modules, Volume 2 - Michiel Hazewinkel 2017-04-11

The theory of algebras, rings, and modules is one of the fundamental domains of modern mathematics. General algebra, more specifically non-commutative algebra, is poised for major advances in the twenty-first century (together with and in interaction with combinatorics), just as topology, analysis, and probability experienced in the twentieth century. This is the second volume of Algebras, Rings and Modules: Non-commutative Algebras and Rings by M. Hazewinkel and N. Gubarenis, a continuation stressing the more important recent results on advanced topics of the structural theory of associative algebras, rings and modules.

Modules and the Structure of Rings - Golan 2017-10-19

This textbook is designed for students with at least one solid semester of abstract algebra, some linear algebra background, and no previous knowledge of module theory. Modules and the Structure of Rings details the use of modules over a ring as a means of considering the structure of the ring itself—explaining the mathematics and "inductive reasoning" used in working on ring theory challenges and emphasizing modules instead of rings. Stressing the inductive aspect of mathematical research underlying the formal deductive style of the literature, this volume offers vital background on current methods for solving hard classification problems of algebraic structures. Written in an informal but completely rigorous style, Modules and the Structure of Rings clarifies sophisticated proofs ... avoids the formalism of category theory ... aids independent study or seminar work ... and supplies end-of-chapter problems. This book serves as an excellent primary text for upper-level undergraduate and graduate students in one-semester courses on ring or module theory—laying a foundation for more advanced study of homological algebra or module theory.

Algebras, Rings and Modules - Michiel Hazewinkel 2005

Lattice-ordered Rings and Modules - Stuart A. Steinberg 2009-11-19

This book provides an exposition of the algebraic aspects of the theory of lattice-ordered rings and lattice-ordered modules. All of the background material on rings, modules, and lattice-ordered groups necessary to make the work self-contained and accessible to a variety of readers is included. Filling a gap in the literature, Lattice-Ordered Rings and Modules may be used as a textbook or for self-study by graduate students and researchers studying lattice-ordered rings and lattice-ordered modules. Steinberg presents the material through 800+ extensive examples of varying levels of difficulty along with numerous exercises at the end of each section. Key topics include: lattice-ordered groups, rings, and fields; archimedean ℓ -groups; f -rings and larger varieties of ℓ -rings; the category of f -modules; various commutativity results.

Groups, Rings, Modules - Maurice Auslander 2014-06-01

Classic monograph covers sets and maps, monoids and groups, unique factorization domains, localization and tensor products, applications of fundamental theorem, algebraic field extension, Dedekind domains, and much more. 1974 edition.