

Jean-Pierre Serre

# Linear Representations of Finite Groups

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Leonard L. Scott



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# Linear Representations Of Finite Groups

**Ernest B. Vinberg**



## Linear Representations Of Finite Groups:

*Linear Representations of Finite Groups* Jean-Pierre Serre, 2012-12-06 This book consists of three parts rather different in level and purpose The first part was originally written for quantum chemists It describes the correspondence due to Frobenius between linear representations and characters This is a fundamental result of constant use in mathematics as well as in quantum chemistry or physics I have tried to give proofs as elementary as possible using only the definition of a group and the rudiments of linear algebra The examples Chapter 5 have been chosen from those useful to chemists The second part is a course given in 1966 to second year students of l'Ecole Normale It completes the first on the following points a degrees of representations and integrality properties of characters Chapter 6 b induced representations theorems of Artin and Brauer and applications Chapters 7-11 c rationality questions Chapters 12 and 13 The methods used are those of linear algebra in a wider sense than in the first part group algebras modules noncommutative tensor products semisimple algebras The third part is an introduction to Brauer theory passage from characteristic 0 to characteristic  $p$  and conversely I have freely used the language of abelian categories projective modules Grothendieck groups which is well suited to this sort of question The principal results are a The fact that the decomposition homomorphism is surjective all irreducible representations in characteristic  $p$  can be lifted virtually i.e. in a suitable Grothendieck group to characteristic 0

*Linear Representations of Groups* Ernest B. Vinberg, 2010-11-23 This book gives an exposition of the fundamentals of the theory of linear representations of finite and compact groups as well as elements of the theory of linear representations of Lie groups As an application we derive the Laplace spherical functions The book is based on lectures that I delivered in the framework of the experimental program at the Mathematics Mechanics Faculty of Moscow State University and at the Faculty of Professional Skill Improvement My aim has been to give as simple and detailed an account as possible of the problems considered The book therefore makes no claim to completeness Also it can in no way give a representative picture of the modern state of the field under study as does for example the monograph of A. A. Kirillov 3 For a more complete acquaintance with the theory of representations of finite groups we recommend the book of C. W. Curtis and I. Reiner 2 and for the theory of representations of Lie groups that of M. A. Naimark 6 Introduction The theory of linear representations of groups is one of the most widely applied branches of algebra Practically every time that groups are encountered their linear representations play an important role In the theory of groups itself linear representations are an irreplaceable source of examples and a tool for investigating groups In the introduction we discuss some examples and en route we introduce a number of notions of representation theory 0 Basic Notions 0 1

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State University and at the Faculty of Professional Skill Improvement My aim has been to give as simple and detailed an account as possible of the problems considered The book therefore makes no claim to completeness Also it can in no way give a representative picture of the modern state of the field under study as does for example the monograph of A A Kirillov 3 For a more complete acquaintance with the theory of representations of finite groups we recommend the book of C W Curtis and I Reiner 2 and for the theory of representations of Lie groups that of M A Naimark 6

**Introduction** The theory of linear representations of groups is one of the most widely applied branches of algebra Practically every time that groups are encountered their linear representations play an important role In the theory of groups itself linear representations are an irreplaceable source of examples and a tool for investigating groups In the introduction we discuss some examples and en route we introduce a number of notions of representation theory

O *Linear Representations of Finite Groups* Steven Alexander,1978  
*Linear Representations of Groups* E B Vinberg,1989-06-01  
*Linear Representations of Groups* Èrnest Borisovich Vinberg,1989  
*Representation Theory of Finite Groups* Martin Burrow,2014-05-05

DIVConcise graduate level exposition covers representation theory of rings with identity representation theory of finite groups more Exercises Appendix 1965 edition div

**Linear Representations of Finite Groups** Paulo Ribenboim,1966  
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**On Kernels of Homomorphisms of Linear Representations of Finite Groups** E. M. Zhmud',195?  
**Introduction to Orthogonal, Symplectic, and Unitary Representations of Finite Groups** Carl R. Riehm,  
Representations of Finite Groups of Lie Type François Digne,Jean Michel,1991-04-26

The authors aim to treat the basic theory of representations of finite groups of Lie type such as linear unitary orthogonal and symplectic groups They emphasize the Curtis Alvis duality map and Mackey s theorem and the results that can be deduced from it They also discuss Deligne Lusztig induction This will be the first elementary treatment of this material in book form and will be welcomed by beginning graduate students in algebra

**Modular Representation Theory of Finite Groups** Alex Wilson,2016-10-01

In mathematics representation theory is a technique for analyzing abstract groups in terms of groups of linear transformations Representation theory studies maps from groups into the general linear group of a finite dimensional vector space For finite groups the theory comes in two distinct flavors In the semisimple case for example over the field of complex numbers one can use character theory to completely understand the representations This by far is not sufficient when the characteristic of the field divides the order of the group Modular representation theory is a branch of mathematics and that part of representation theory that studies linear representations of finite groups over a field  $K$  of positive characteristic As well as having applications to group theory modular representations arise naturally in other branches of mathematics such as algebraic geometry coding theory combinatorics and number theory This book aims to the modular representation theory of finite groups from an algebraic point of view regarding representations as modules over the group algebra

**Representations of Finite and Compact Groups** Barry Simon,1996 This text is a comprehensive pedagogical presentation of the theory of

representation of finite and compact Lie groups It considers both the general theory and representation of specific groups Representation theory is discussed on the following types of groups finite groups of rotations permutation groups and classical compact semisimple Lie groups Along the way the structure theory of the compact semisimple Lie groups is exposed This is aimed at research mathematicians and graduate students studying group theory *An Introduction to Groups, Groupoids and Their Representations* Alberto Ibort, Miguel A. Rodriguez, 2019-10-28 This book offers an introduction to the theory of groupoids and their representations encompassing the standard theory of groups Using a categorical language developed from simple examples the theory of finite groupoids is shown to knit neatly with that of groups and their structure as well as that of their representations is described The book comprises numerous examples and applications including well known games and puzzles databases and physics applications Key concepts have been presented using only basic notions so that it can be used both by students and researchers interested in the subject Category theory is the natural language that is being used to develop the theory of groupoids However categorical presentations of mathematical subjects tend to become highly abstract very fast and out of reach of many potential users To avoid this foundations of the theory starting with simple examples have been developed and used to study the structure of finite groups and groupoids The appropriate language and notions from category theory have been developed for students of mathematics and theoretical physics The book presents the theory on the same level as the ordinary and elementary theories of finite groups and their representations and provides a unified picture of the same The structure of the algebra of finite groupoids is analysed along with the classical theory of characters of their representations Unnecessary complications in the formal presentation of the subject are avoided The book offers an introduction to the language of category theory in the concrete setting of finite sets It also shows how this perspective provides a common ground for various problems and applications ranging from combinatorics the topology of graphs structure of databases and quantum physics [Elements of Linear Representation of Finite Groups](#) Daniel J. Harned, 1990 [An Introduction to the Representation Theory of Groups](#) Emmanuel Kowalski, 2014-08-28 Representation theory is an important part of modern mathematics not only as a subject in its own right but also as a tool for many applications It provides a means for exploiting symmetry making it particularly useful in number theory algebraic geometry and differential geometry as well as classical and modern physics The goal of this book is to present in a motivated manner the basic formalism of representation theory as well as some important applications The style is intended to allow the reader to gain access to the insights and ideas of representation theory not only to verify that a certain result is true but also to explain why it is important and why the proof is natural The presentation emphasizes the fact that the ideas of representation theory appear sometimes in slightly different ways in many contexts Thus the book discusses in some detail the fundamental notions of representation theory for arbitrary groups It then considers the special case of complex representations of finite groups and discusses the representations of compact groups in both cases with some important applications There is a short

introduction to algebraic groups as well as an introduction to unitary representations of some noncompact groups The text includes many exercises and examples

**Characters of Finite Groups** I. A. G. Berkovich, E. M. Zhmud, 1998-09-29 This book places character theory and its applications to finite groups within the reach of people with a comparatively modest mathematical background The work concentrates mostly on applications of character theory to finite groups The main themes are degrees and kernels of irreducible characters the class number and the number of nonlinear irreducible characters values of irreducible characters characterizations and generalizations of Frobenius groups and generalizations of monomial groups The presentation is detailed and many proofs of known results are new

Representations of Linear Groups Rolf Berndt, 2007-12-22 This is an elementary introduction to the representation theory of real and complex matrix groups The text is written for students in mathematics and physics who have a good knowledge of differential integral calculus and linear algebra and are familiar with basic facts from algebra number theory and complex analysis The goal is to present the fundamental concepts of representation theory to describe the connection between them and to explain some of their background The focus is on groups which are of particular interest for applications in physics and number theory e g Gell Mann's eightfold way and theta functions automorphic forms The reader finds a large variety of examples which are presented in detail and from different points of view

*Finite Groups and Their Linear Representations* P. Kesava Menon, 1965

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