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#### 前言

We have attempted in this book to provide a leisurely introduction to the representation theory of groups. But why should this subject interest you ?

Representation theory is concerned with the ways of writing a group as a group of matrices. Not only is the theory beautiful in its own right, but it also provides one of the keys to a proper understanding of finitegroups. For example, it is often vital to have a concrete description of aparticular group; this is achieved by finding a representation of the group as a group of matrices. Moreover, by studying the different representations of the group, it is possible to prove results which lieoutside the framework of representation theory. One simple example: all groups of order p2 (where p is a prime number) are abelian; this can be shown quickly using only group theory, but it is also a consequence of basic results about representations. More generally, all groups of order (p and q primes) are soluble; this again is a statement purely about groups, but the best proof, due to Burnside, is an outstanding example of the use of representation theory. In fact, the range of applications of the theory extends far beyond the boundaries of pure mathematics, and includes theoretical physics and chemistry we describe one suchapplication in the last chapter. The book is suitable for students who have taken first undergraduatecourses involving group theory and linear algebra. We have included twopreliminary chapters which cover the necessary background material. The basic theory of representations is developed in Chapters 3-23, andour methods concentrate upon the use of modules; although this accords with the more modem style of algebra, in several instances our proofsdiffer from those found in other textbooks. The main results are elegantand surprising.



#### 内容概要

Representation theory is concerned with the ways of writing a group as a group of matrices. Not only is the theory beautiful in its own right, but it also provides one of the keys to a proper understanding of finitegroups. For example, it is often vital to have a concrete description of aparticular group; this is achieved by finding a representation of thegroup as a group of matrices. Moreover, by studying the different presentations of the group, it is possible to prove results which lieoutside the framework of representation theory. One simple example: allgroups of order p2 (where p is a prime number) are abelian; this can be be be only using only group theory, but it is also a consequence of basic results about representations.



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