

Michel Broué

## From Rings and Modules to Hopf Algebras

One Flew Over the Algebraist's Nest

The textbook provides an introduction to fundamental concepts of algebra at upper undergraduate to graduate level, covering the theory of rings, fields and modules, as well as the representation theory of finite groups.

Throughout the book, the exposition relies on universal constructions, making systematic use of quotients and category theory — whose language is introduced in the first chapter. The book is divided into four parts. Parts I and II cover foundations of rings and modules, field theory and generalities on finite group representations, insisting on rings of polynomials and their ideals. Part III culminates in the structure theory of finitely generated modules over Dedekind domains and its applications to abelian groups, linear maps, and foundations of algebraic number theory. Part IV is an extensive study of linear representations of finite groups over fields of characteristic zero, including graded representations and graded characters as well as a final chapter on the Drinfeld–Lusztig double of a group algebra, appearing for the first time in a textbook at this level.

Based on over twenty years of teaching various aspects of algebra, mainly at the École Normale Supérieure (Paris) and at Peking University, the book reflects the audiences of these courses as well as the taste of the author. In particular, foundations of abstract algebra, like linear algebra and elementary group theory, are assumed of the reader. Each of the of four parts can be used for a course — with a little ad hoc complement on the language of categories. Thanks to its rich choice of topics, the book can also serve students as a reference throughout their studies, from undergraduate to advanced graduate level.

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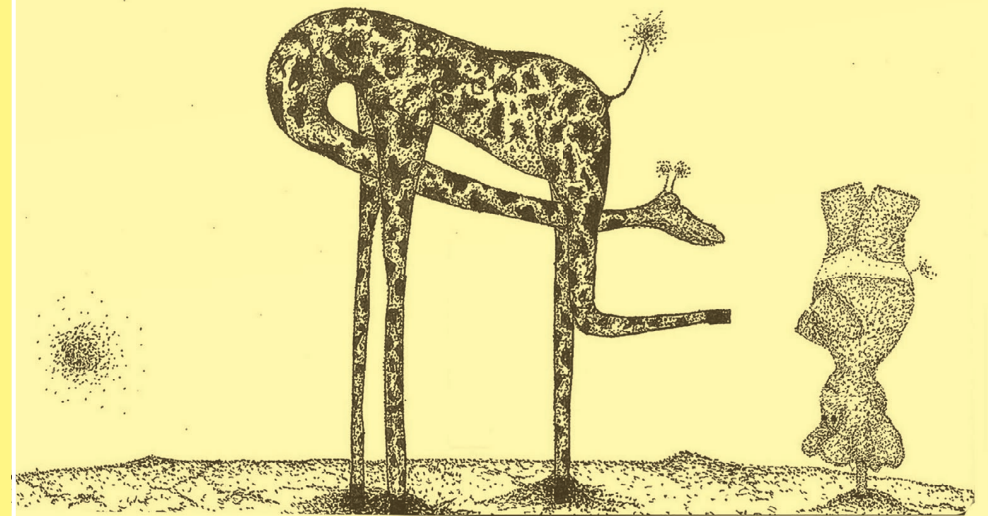
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