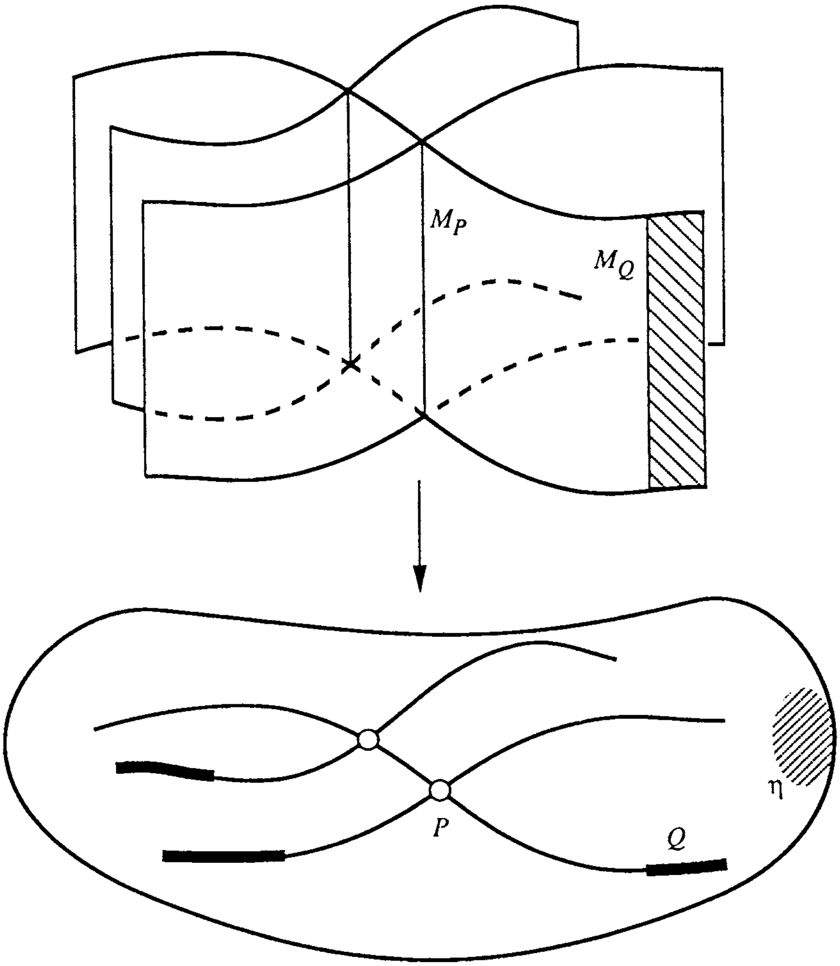
Commutative algebra is at the crossroads of algebra, number theory and algebraic geometry. This textbook, intended for advanced undergraduate or beginning graduate students with some previous experience of rings and fields, covers roughly the same material as Chapters 1–8 of Atiyah and Macdonald [A & M], but is cheaper, has more pictures, and is considerably more opinionated.

Alongside standard algebraic notions such as generators of modules and the ascending chain condition, the book develops in detail the geometric view of a commutative ring as the ring of functions on a space. The starting point is the Nullstellensatz, which provides a close link between the geometry of a variety V and the algebra of its coordinate ring $A = k[V]$; however, many of the geometric ideas arising from varieties apply also to fairly general rings.

The final chapter relates the material of the book to more advanced topics in commutative algebra and algebraic geometry. It includes an account of some famous "pathological" examples of Akizuki and Nagata, and a brief but thought-provoking essay on the changing position of abstract algebra in today's world.

LONDON MATHEMATICAL SOCIETY STUDENT TEXTS

1 Introduction to combinators and λ-calculus, J.R. HINDLEY & J.P. SELDIN
2 Building models by games, WILFRID HODGES
3 Local fields, J.W.S. CASSELS
4 An introduction to twistor theory: Second edition, S.A. HUGGETT & K.P. TOD
5 Introduction to general relativity, L.P. HUGHSTON & K.P. TOD
6 Lectures on stochastic analysis: diffusion theory, DANIEL W. STROOCK
7 The theory of evolution and dynamical systems, J. HOFBAUER & K. SIGMUND
8 Summing and nuclear norms in Banach space theory, G.J.O. JAMESON
9 Automorphisms of surfaces after Nielsen and Thurston, A. CASSON & S. BLEILER
10 Nonstandard analysis and its applications, N. CUTLAND (ed)
11 Spacetime and singularities, G. NABER
12 Undergraduate algebraic geometry, MILES REID
13 An introduction to Hankel operators, J.R. PARTINGTON
14 Combinatorial group theory: a topological approach, DANIEL E. COHEN
15 Presentations of groups, D.L. JOHNSON
16 An introduction to noncommutative Noetherian rings, K.R. GOODEARL & R.B. WARFIELD, JR.
17 Aspects of quantum field theory in curved spacetime, S.A. FULLING
18 Braids and coverings: selected topics, VAGN LUNDSGAARD HANSEN
19 Steps in commutative algebra, R.Y. SHARP
20 Communication theory, C.M. GOLDIE & R.G.E. PINCH
21 Representations of finite groups of Lie type, FRANÇOIS DIGNE & JEAN MICHEL
22 Designs, graphs, codes, and their links, P.J. CAMERON & J.H. VAN LINT
23 Complex algebraic curves, FRANCES KIRWAN
24 Lectures on elliptic curves, J.W.S. CASSELS
25 Hyperbolic geometry, BIRGER IVERSEN
26 An introduction to the theory of L-functions and Eisenstein series, H. HIDA
27 Hilbert Space: compact operators and the trace theorem, J.R. RETHERFORD
28 Potential theory in the complex plane, T. RANSFORD
29 Undergraduate commutative algebra, M. REID
32 Lectures on Lie Groups and Lie Algebras, R. CARTER, G. SEGAL & I. MACDONALD
33 A primer of algebraic *D*-modules, S.C. COUTINHO



Frontispiece: let A be a ring and M an A-module ...

London Mathematical Society Student Texts 29

Undergraduate Commutative Algebra

Miles Reid
University of Warwick

CAMBRIDGE
UNIVERSITY PRESS

Published by the Press Syndicate of the University of Cambridge
The Pitt Building, Trumpington Street, Cambridge CB2 1RP
40 West 20th Street, New York, NY 10011-4211, USA
10 Stamford Road, Oakleigh, Melbourne 3166, Australia

First published 1995

A catalogue record for this book is available from the British Library

Library of Congress cataloging in publication data

Reid, Miles (Miles A.)
Undergraduate commutative algebra / Miles Reid.
p. cm. - (London Mathematical Society student texts; 29)
Includes bibliographical references
ISBN 0 521 45255 4. - ISBN 0 521 45889 7 (pbk.)
1. Commutative algebra. I. Title. II. Series.
QA251.3.R45 1995
512'.24--dc20 94-27644 CIP

ISBN 0 521 45255 4 hardback
ISBN 0 521 45889 7 paperback

Transferred to digital printing 2002

Contents

Illustrations

Cambridge University Press
0521452554 - Undergraduate Commutative Algebra
Miles Reid
Frontmatter
More information

Preface

These are notes from a commutative algebra course taught at the University of Warwick several times since 1978. In addition to standard material, the book contrasts the methods and ideology of abstract algebra as practiced in the 20th century with its concrete applications in algebraic geometry and algebraic number theory.