T.Y. Lam

A First Course in Noncommutative Rings

Second Edition



Contents

Prefa	ace to the Second Edition	vii
Prefa	ace to the First Edition	ix
Notes to the Reader		xvii
	PTER 1 Iderburn–Artin Theory	1
§1.	Basic Terminology and Examples	. 2
	Exercises for §1	22
§2.	Semisimplicity	25
§3.	Exercises for §2 Structure of Semisimple Rings	29 30
<i>§5</i> .	Exercises for §3	50 45
Сна	pter 2	
Jacobson Radical Theory		48
§4.	The Jacobson Radical	50
	Exercises for §4	63
§5.	Jacobson Radical Under Change of Rings	67
84	Exercises for §5	77
§6.	Group Rings and the J-Semisimplicity Problem Exercises for §6	78 98
Сна	PTER 3	
Introduction to Representation Theory		101
§7.	Modules over Finite-Dimensional Algebras	102
	Exercises for §7	116

· .

xiii

§8.	Representations of Groups	117
3	Exercises for §8	137
§9.	Linear Groups	141
3	Exercises for §9	152
	Energies for 32	102
Сна	pter 4	
	ne and Primitive Rings	153
1 1 111	ie and i finitive Kings	155
§10.	The Prime Radical; Prime and Semiprime Rings	154
	Exercises for §10	168
§11.	Structure of Primitive Rings; the Density Theorem	171
	Exercises for §11	188
§12.	Subdirect Products and Commutativity Theorems	191
	Exercises for §12	198
	PTER 5	
Intr	oduction to Division Rings	202
813	Division Rings	203
310.	Exercises for §13	214
814	Some Classical Constructions	216
3	Exercises for §14	235
815.	Tensor Products and Maximal Subfields	238
3.0.	Exercises for §15	247
816.	Polynomials over Division Rings	248
3	Exercises for §16	258
Сна	pter 6	
Ord	ered Structures in Rings	261
	_	
§17.	Orderings and Preorderings in Rings	262
	Exercises for §17	269
§18.	Ordered Division Rings	270
	Exercises for §18	276
~		
	PTER 7	
Loc	al Rings, Semilocal Rings, and Idempotents	279
§19.	Local Rings	279
0	Exercises for §19	293
§20.	Semilocal Rings	296
v	Appendix: Endomorphism Rings of Uniserial Modules	302
	Exercises for §20	306
§21.	Th Theory of Idempotents	308
-	Exercises for §21	322
§22.	Central Idempotents and Block Decompositions	326
-	Exercises for §22	333

Contents

xiv

Contents

	PTER 8 ect and Semiperfect Rings	335
§23.	Perfect and Semiperfect Rings	336
	Exercises for §23	346
§24.	Homological Characterizations of Perfect and Semiperfect Rings	347
	Exercises for §24	358
§25.	Principal Indecomposables and Basic Rings	359
-	Exercises for §25	368
Refe	erences	370
Name Index		373
Subject Index		377