

CONTENTS

Preface

xi

INTRODUCTION: Getting Started

1

Notes for students: how to use this text

1

CHAPTER 1 Linear Equations

5

1.1	Introduction to algebra	6
1.1.1	Negative numbers	7
1.1.2	Expressions	9
1.1.3	Brackets	12
	Key Terms	17
	Exercise 1.1	18
	Exercise 1.1*	20
1.2	Further algebra	22
1.2.1	Fractions	22
1.2.2	Equations	29
1.2.3	Inequalities	33
	Key Terms	36
	Exercise 1.2	36
	Exercise 1.2*	38
1.3	Graphs of linear equations	40
	Key Terms	51
	Exercise 1.3	52
	Exercise 1.3*	53
1.4	Algebraic solution of simultaneous linear equations	55
	Key Term	65
	Exercise 1.4	65
	Exercise 1.4*	66
1.5	Supply and demand analysis	67
	Key Terms	80
	Exercise 1.5	80
	Exercise 1.5*	82
1.6	Transposition of formulae	84
	Key Terms	91
	Exercise 1.6	91
	Exercise 1.6*	92
1.7	National income determination	93
	Key Terms	105
	Exercise 1.7	105
	Exercise 1.7*	106
	Formal mathematics	109
	Multiple choice questions	112
	Examination questions	116

CHAPTER 2 Non-linear Equations

2.1	Quadratic functions	121
	Key Terms	122
	Exercise 2.1	136
	Exercise 2.1*	137
2.2	Revenue, cost and profit	138
	Key Terms	140
	Exercise 2.2	148
	Exercise 2.2*	148
2.3	Indices and logarithms	150
	2.3.1 Index notation	151
	2.3.2 Rules of indices	155
	2.3.3 Logarithms	161
	2.3.4 Summary	167
	Key Terms	168
	Exercise 2.3	168
	Exercise 2.3*	170
2.4	The exponential and natural logarithm functions	172
	Key Terms	182
	Exercise 2.4	182
	Exercise 2.4*	183
	Formal mathematics	186
	Multiple choice questions	189
	Examination questions	193

CHAPTER 3 Mathematics of Finance

3.1	Percentages	197
	3.1.1 Index numbers	198
	3.1.2 Inflation	204
	Key Terms	208
	Exercise 3.1	210
	Exercise 3.1*	210
3.2	Compound interest	213
	Key Terms	216
	Exercise 3.2	226
	Exercise 3.2*	228
3.3	Geometric series	230
	Key Terms	238
	Exercise 3.3	238
	Exercise 3.3*	239
3.4	Investment appraisal	241
	Key Terms	253
	Exercise 3.4	253
	Exercise 3.4*	255
	Formal mathematics	257
	Multiple choice questions	259
	Examination questions	263

CHAPTER 4 Differentiation

4.1	The derivative of a function	267
	Key Terms	268
	Exercise 4.1	277
	Exercise 4.1*	277
		278

4.2	Rules of differentiation	279
	Rule 1 The constant rule	279
	Rule 2 The sum rule	280
	Rule 3 The difference rule	281
	Key Terms	286
	Exercise 4.2	286
	Exercise 4.2*	288
4.3	Marginal functions	290
	4.3.1 Revenue and cost	290
	4.3.2 Production	297
	4.3.3 Consumption and savings	299
	Key Terms	301
	Exercise 4.3	301
	Exercise 4.3*	302
4.4	Further rules of differentiation	304
	Rule 4 The chain rule	305
	Rule 5 The product rule	307
	Rule 6 The quotient rule	310
	Exercise 4.4	312
	Exercise 4.4*	313
4.5	Elasticity	314
	Key Terms	326
	Exercise 4.5	326
	Exercise 4.5*	327
4.6	Optimisation of economic functions	329
	Key Terms	345
	Exercise 4.6	345
	Exercise 4.6*	347
4.7	Further optimisation of economic functions	348
	Key Term	359
	Exercise 4.7*	359
4.8	The derivative of the exponential and natural logarithm functions	361
	Exercise 4.8	370
	Exercise 4.8*	371
	Formal mathematics	373
	Multiple choice questions	376
	Examination questions	382

CHAPTER 5 Partial Differentiation

5.1	Functions of several variables	390
	Key Terms	400
	Exercise 5.1	401
	Exercise 5.1*	402
5.2	Partial elasticity and marginal functions	404
	5.2.1 Elasticity of demand	404
	5.2.2 Utility	407
	5.2.3 Production	413
	Key Terms	415
	Exercise 5.2	416
	Exercise 5.2*	418
5.3	Comparative statics	420
	Key Terms	429
	Exercise 5.3*	429

5.4	Unconstrained optimisation	433
	Key Terms	444
	Exercise 5.4	444
	Exercise 5.4*	445
5.5	Constrained optimisation	447
	Key Terms	456
	Exercise 5.5	457
	Exercise 5.5*	458
5.6	Lagrange multipliers	460
	Key Terms	468
	Exercise 5.6	469
	Exercise 5.6*	470
	Formal mathematics	472
	Multiple choice questions	474
	Examination questions	477

CHAPTER 6 Integration

6.1	Indefinite integration	484
	Key Terms	495
	Exercise 6.1	496
	Exercise 6.1*	497
6.2	Definite integration	499
6.2.1	Consumer's surplus	503
6.2.2	Producer's surplus	504
6.2.3	Investment flow	506
6.2.4	Discounting	508
	Key Terms	509
	Exercise 6.2	509
	Exercise 6.2*	510
	Formal mathematics	513
	Multiple choice questions	515
	Examination questions	518

CHAPTER 7 Matrices

7.1	Basic matrix operations	524
7.1.1	Transposition	526
7.1.2	Addition and subtraction	527
7.1.3	Scalar multiplication	530
7.1.4	Matrix multiplication	531
7.1.5	Summary	539
	Key Terms	539
	Exercise 7.1	540
	Exercise 7.1*	542
7.2	Matrix inversion	545
	Key Terms	560
	Exercise 7.2	560
	Exercise 7.2*	561
7.3	Cramer's rule	564
	Key Term	572
	Exercise 7.3	572
	Exercise 7.3*	573

Formal mathematics	576
Multiple choice questions	577
Examination questions	581

CHAPTER 8 Linear Programming

8.1 Graphical solution of linear programming problems	585
Key Terms	586
Exercise 8.1	600
Exercise 8.1*	601
8.2 Applications of linear programming	602
Key Terms	604
Exercise 8.2	612
Exercise 8.2*	612
Formal mathematics	614
Multiple choice questions	617
Examination questions	618

CHAPTER 9 Dynamics

9.1 Difference equations	627
9.1.1 National income determination	628
9.1.2 Supply and demand analysis	634
Key Terms	636
Exercise 9.1	639
Exercise 9.1*	640
9.2 Differential equations	643
9.2.1 National income determination	649
9.2.2 Supply and demand analysis	651
Key Terms	653
Exercise 9.2	654
Exercise 9.2*	655
Formal mathematics	658
Multiple choice questions	659
Examination questions	662

Answers to Problems

Chapter 1	664
Chapter 2	664
Chapter 3	674
Chapter 4	683
Chapter 5	687
Chapter 6	698
Chapter 7	705
Chapter 8	709
Chapter 9	715
Glossary	719
Index	723
	730