Table of Contents

1	Preliminaries
1.1	NUMBERS AND THEIR PROPERTIES 1
1.2	THE REAL LINE, ORDER, ABSOLUTE VALUE 10
1.3	INTEGRAL EXPONENTS 16
1.4	ROOTS AND RADICALS 20
1.5	RATIONAL EXPONENTS 25
1.6	POLYNOMIALS 28
1.7	factoring 37
1.8	OPERATIONS ON RATIONAL EXPRESSIONS 44
	REVIEW OF CHAPTER 1 49
	TECHNIQUE REVIEW EXERCISES, CHAPTER 1 54
2	Functions and Graphs
2.1	TWO DIMENSIONAL COORDINATE SYSTEMS, DISTANCE 57
2.2	FUNCTIONS 62
2.3	GRAPHS OF FUNCTIONS AND EQUATIONS, CIRCLES 69
2.4	LINEAR FUNCTIONS AND EQUATIONS 77
2.5	QUADRATIC FUNCTIONS, PARABOLAS 86
2.6	POLYNOMIAL FUNCTIONS 95

GRAPHS OF RATIONAL FUNCTIONS 105

2.7

TABLE OF CONTENTS

ELLIPSES AND HYPERBOLAS 111

2.8

	REVIEW OF CHAPTER 2 120
	TECHNIQUE REVIEW EXERCISES, CHAPTER 2 126
3	Equations and Inequalities
3.1	SOLUTIONS: ELEMENTARY ABSOLUTE VALUE EQUATIONS AND INEQUALITIES 129
3.2	LINEAR EQUATIONS AND INEQUALITIES 136
3.3	APPLICATIONS OF LINEAR EQUATIONS 143
3.4	QUADRATIC EQUATIONS 147
3.5	EQUATIONS OF QUADRATIC TYPE 155
3.6	THE USE OF NONEQUIVALENT EQUATIONS 157
3.7	APPLICATIONS OF QUADRATIC EQUATIONS 163
3.8	VARIATION 166
3.9	GRAPHS AND QUADRATIC INEQUALITIES 171
3.10	POLYNOMIAL AND RATIONAL EQUATIONS AND INEQUALITIES 177 REVIEW OF CHAPTER 3 183 TECHNIQUE REVIEW EXERCISES, CHAPTER 3 187
4	Exponential and Logarithmic Functions
4.1	THE EXPONENTIAL FUNCTION 189
4.2	INVERSE FUNCTIONS 198
4.3	THE LOGARITHMIC FUNCTION 204
4.4	COMMON LOGARITHMS 213
4.5	NATURAL LOGARITHMS 222
	REVIEW OF CHAPTER 4 226
	TECHNIQUE REVIEW EXERCISES, CHAPTER 4 228
5	Trigonometric Functions and Graphs
U. I	MINULES ZZ3

5.2 THE TRIGONOMETRIC FUNCTIONS 240

5.3 BASIC IDENTITIES 2475.4 REFERENCE ANGLES 252

TABLE OF CONTENTS

5.5	APPROXIMATION OF TRIGONOMETRIC FUNCTIONS BY
5.6	TABLES 257 APPROXIMATION OF TRIGONOMETRIC FUNCTIONS BY
	CALCULATOR 263
5.7	GRAPHS OF THE TRIGONOMETRIC FUNCTIONS 265
5.8	PERIOD, AMPLITUDE, PHASE SHIFT, AND VERTICAL SHIFT 275
5.9	ADDITION OF ORDINATES 285
	REVIEW OF CHAPTER 5 288
	TECHNIQUE REVIEW EXERCISES, CHAPTER 5 294
6	Triangle Trigonometry
6.1	INTRODUCTION 297
6.2	DETERMINING ANGLES FROM FUNCTIONAL VALUES BY
	CALCULATOR 299
6.3	RIGHT TRIANGLE TRIGONOMETRY 303
6.4	THE LAW OF SINES 311
6.5	THE AMBIGUOUS CASE 317
6.6	THE LAW OF COSINES 322
6.7	GEOMETRIC VECTORS 328
	REVIEW OF CHAPTER 6 337
	TECHNIQUE REVIEW EXERCISES, CHAPTER 6 341
7	Identities, Equations, and Inverse
-	
	Trigonometric Functions
7.1	ESTABLISHING TRIGONOMETRIC IDENTITIES 343
7.2	THE SUBTRACTION FORMULA FOR COSINE 347
7.3	THE OTHER ADDITION AND SUBTRACTION FORMULAS 353
7.4	DOUBLE ANGLE AND HALF ANGLE FORMULAS 357
7.5	THE SUM, DIFFERENCE, AND PRODUCT FORMULAS 363
7.6	TRIGONOMETRIC EQUATIONS 268
7.7	THE INVERSE OF THE SINE FUNCTION 375
7.8	THE OTHER INVERSE TRIGONOMETRIC FUNCTIONS 380
	REVIEW OF CHAPTER 7 387
	TECHNIQUE REVIEW EXERCISES, CHAPTER 7 390

8	The Complex Numbers
8.1	COMPLEX NUMBERS AND THE COMPLEX PLANE 393
8.2	THE TRIGONOMETRIC OR POLAR FORM OF A COMPLEX NUMBER 403
8.3	DEMOIVRE'S THEOREM, POWERS, AND ROOTS OF COMPLEX NUMBERS 410
	REVIEW OF CHAPTER 8 417
	TECHNIQUE REVIEW EXERCISES, CHAPTER 8 419
9	Elementary Theory of Equations
9.1	THE REMAINDER THEOREM AND THE FACTOR THEOREM 421
9.2	THE FUNDAMENTAL THEOREM OF ALGEBRA; ZEROS OF POLYNOMIALS 427
9.3	SYNTHETIC DIVISION 430
9.4	RATIONAL ROOTS OF EQUATIONS 434
9.5	THE BISECTION METHOD OF ROOT APPROXIMATION 439
9.6	PARTIAL FRACTIONS 441
	REVIEW OF CHAPTER 9 446
	TECHNIQUE REVIEW EXERCISES, CHAPTER 9 448
10	Systems of Equations and Inequal-
	ities; Matrices and Determinants;
	Linear Programming
10.1	SYSTEMS OF LINEAR EQUATIONS 450
10.2	MATRICES 460
10.3	OPERATIONS ON MATRICES 466
10.4	SQUARE MATRICES AND INVERSES 473
10.5	DETERMINANTS 480
10.6	APPLICATIONS OF DETERMINANTS 488
10.7	NONLINEAR SYSTEMS OF EQUATIONS 492
10.8	SYSTEMS OF LINEAR INEQUALITIES 498
10.9	ELEMENTARY LINEAR PROGRAMMING 506
	REVIEW OF CHAPTER 10 512
	TECHNIQUE REVIEW EXERCISES, CHAPTER 10 517

TABLE OF CONTENTS

11	Sequences, Series, and Counting
11.1	SEQUENCES AND SERIES 519
11.2	PERMUTATIONS AND COMBINATIONS 533
11.3	THE BINOMIAL THEOREM 543
11.4	MATHEMATICAL INDUCTION 548
	REVIEW OF CHAPTER 11 554
	TECHNIQUE REVIEW EXERCISES, CHAPTER 11 557
	Appendix
A.1	INTERPOLATION A1
A.2	CALCULATIONS WITH COMMON LOGARITHMS A4
TABLE 1	COMMON LOGARITHMS A8
TABLE 2	VALUES OF TRIGONOMETRIC FUNCTIONS FOR
	DEGREES A10
TABLE 3	VALUES OF TRIGONOMETRIC FUNCTIONS FOR RADIANS AND
	REAL NUMBERS A18
TABLE 4	TRIGONOMETRIC FUNCTIONS FOR DECIMAL DEGREES A22
	ANSWERS TO ODD NUMBERED EXERCISES A35
	INDEX A83