

Contents

<i>Preface</i>	ix
<i>Acknowledgments</i>	xiii
<i>To the Students</i>	xv
<i>List of Graphing Calculator Topics</i>	xvii

Chapter 1 ■ The Foundations of Algebra 1

1.1	The Real Number System	2
1.2	The Real Number Line	12
1.3	Algebraic Expressions; Polynomials	18
1.4	Factoring	29
1.5	Rational Expressions	38
1.6	Integer Exponents	46
1.7	Rational Exponents and Radicals	53
1.8	Complex Numbers	64

Chapter 2 ■ Equations and Inequalities 79

2.1	Linear Equations in One Unknown	80
2.2	Applications: From Words to Algebra	87

- 2.3** The Quadratic Equation 98
- 2.4** Applications of Quadratic Equations 115
- 2.5** Linear and Quadratic Inequalities 120
- 2.6** Absolute Value in Equations and Inequalities 133

Chapter 3 ■ Functions 145

- 3.1** The Rectangular Coordinate System 146
- 3.2** Functions and Function Notation 160
- 3.3** Graphs of Functions 168
- 3.4** Linear Functions 185
- 3.5** The Algebra of Functions; Inverse Functions 199
- 3.6** Direct and Inverse Variation 214
- Cumulative Review Exercises: Chapters 1–3* 226

Chapter 4 ■ Polynomial Functions 229

- 4.1** Quadratic Functions and Their Graphs 231
- 4.2** Graphs of Polynomial Functions of Higher Degree 241
- 4.3** Polynomial Division and Synthetic Division 253
- 4.4** The Remainder and Factor Theorems 257
- 4.5** Factors and Zeros 261
- 4.6** Real, Complex and Rational Zeros 272
- 4.7** Approximation of the Zeros of Polynomial Functions 282

Chapter 5 ■ Rational Functions and Conic Sections 293

- 5.1** Rational Functions and Their Graphs 294
- 5.2** The Circle 308
- 5.3** The Parabola 316
- 5.4** The Ellipse and Hyperbola 326
- 5.5** Translation of Axes 336

Chapter 6 ■ Exponential and Logarithmic Functions 351

- 6.1** A Brief Review of Inverse Functions 352
- 6.2** Exponential Functions 356
- 6.3** Logarithmic Functions 371
- 6.4** Fundamental Properties of Logarithms 383
- 6.5** Exponential and Logarithmic Equations 390
- Cumulative Review Exercises: Chapters 4–6* 401

Chapter 7 ■ The Trigonometric Functions 405

- 7.1** Angles and Their Measurement 406
- 7.2** Right Triangle Trigonometry 417
- 7.3** The Trigonometric Functions 426
- 7.4** Special Values and Properties of Trigonometric Functions 436
- 7.5** Graphs of the Trigonometric Functions 451
- 7.6** Graphs: Amplitude, Period and Phase Shift 458
- 7.7** The Inverse Trigonometric Functions 466
- 7.8** Applications 476

Chapter 8 ■ Analytic Trigonometry 489

- 8.1** Trigonometric Identities and Their Verification 490
- 8.2** The Addition and Subtraction Formulas 496
- 8.3** Double-Angle and Half-Angle Formulas 503
- 8.4** The Product-Sum Formulas 509
- 8.5** Trigonometric Equations 513

Chapter 9 ■ Applications of Trigonometry 523

- 9.1** Law of Sines 524
- 9.2** Law of Cosines 530
- 9.3** Trigonometry and Complex Numbers 535
- 9.4** Polar Coordinates 545
- 9.5** Vectors 553
- Cumulative Review Exercises: Chapters 7–9* 570

Chapter 10 ■ Systems of Equations and Inequalities 573

- 10.1** Systems of Equations in Two Unknowns 574
- 10.2** Applications: Word Problems 584
- 10.3** Systems of Linear Equations in Three Unknowns 592
- 10.4** Applications: Partial Fractions 599
- 10.5** Systems of Linear Inequalities 606
- 10.6** Linear Programming 616

Chapter 11 ■ Matrices, Linear Systems, and Determinants 627

- 11.1** Matrices and Linear Systems 628
- 11.2** Matrix Operations and Applications 639
- 11.3** Inverses of Matrices 647
- 11.4** Determinants 658
- 11.5** Properties of Determinants 664
- 11.6** Cramer's Rule 668

Chapter 12 ■ Topics in Algebra 677

- 12.1** Sequences, Sigma Notation and Series 678
- 12.2** Arithmetic Sequences and Series 688
- 12.3** Geometric Sequences and Series 694
- 12.4** Mathematical Induction 703
- 12.5** The Binomial Theorem 706
- 12.6** Counting: Permutations and Combinations 713
- 12.7** Probability 724
- Cumulative Review Exercises: Chapters 10–12 735*

*Answers to Selected Odd-Numbered Exercises, Review Exercises,
and Review Tests 737*

Solutions to Selected Review Exercises 797

Index 815