Contents

Algebra Review



- 1.1 The Real Number System 3
- 1.2 Exponents, Roots, and Radicals 13
- 1.3 Polynomials and Factoring 25
- 1.4 Rational Expressions 35
- 1.5 Linear and Quadratic Equations 43
- 1.6 Linear Inequalities 53
- 1.7 Equations and Inequalities Involving Absolute Value 59
- 1.8 Other Types of Equations 67

Chapter 1 Summary 77

Review 1 Exercises 81

Chapter 1 Test 86

2 Functions and Graphs 89



- 2.1 The Coordinate System; Lines and Their Graphs 91
- 2.2 Coordinate Geometry, Circles, and Other Equations 107
- 2.3 Functions 119
- 2.4 Graphs and Functions 131
- 2.5 Analyzing the Graph of a Function 145
- 2.6 The Algebra of Functions 155
- 2.7 Transformations of the Graph of a Function 165
- 2.8 Linear Functions and Models; Variation 181

Chapter 2 Summary 193

Review 2 Exercises 197

Chapter 2 Test 204

Polynomial and Rational Functions 207



- 3.1 Quadratic Functions and Their Graphs 209
- 3.2 Polynomial Functions and Their Graphs 231
- 3.3 Division of Polynomials; the Remainder and Factor Theorems 251
- 3.4 Real Zeros of Polynomials; Solutions of Equations 259
- 3.5 Complex Numbers 267
- 3.6 The Fundamental Theorem of Algebra; Complex Zeros 277
- 3.7 Rational Functions 283
- 3.8 Quadratic, Polynomial, and Rational Inequalities 297

Chapter 3 Summary 305
Review 3 Exercises 309

Chapter 3 Test 314

4 Exponential and Logarithmic Functions 317



- 4.1 Inverse Functions 319
- **4.2** Exponential Functions **33**
- 4.3 Logarithmic Functions 345
- 4.4 Properties of Logarithms 361
- 4.5 Exponential and Logarithmic Equations 369
- 4.6 Exponential, Logistic, and Logarithmic Models 379

Chapter 4 Summary 391
Review 4 Exercises 395

Chapter 4 Test 399

5 Trigonometric Functions 401



- 5.1 Angles and Their Measures 403
- 5.2 Trigonometric Functions Using the Unit Circle 415
- 5.3 Right Triangle Trigonometry 429
- 5.4 Trigonometric Functions of Any Angle Using Right Triangles 443
- **5.5** Graphs of Sine and Cosine Functions **455**
- 5.6 Graphs of Other Trigonometric Functions 469
- 5.7 Inverse Trigonometric Functions 481

Chapter 5 Summary 493

Review 5 Exercises 498

Chapter 5 Test 501



Trigonometric Identities and Equations 503



- 6.1 Verifying Identities 505
- 6.2 Sum and Difference Identities 513
- 6.3 Multiple-Angle Identities; Sum and Product Identities 523
- **6.4** Trigonometric Equations **533**

Chapter 6 Summary 545

Review 6 Exercises 548

Chapter 6 Test 551

7

Additional Topics in Trigonometry 553



- 7.1 The Law of Sines 555
- 7.2 The Law of Cosines 569
- 7.3 Polar Coordinates 581
- 7.4 Graphs of Polar Equations 591
- **7.5** Vectors **605**
- 7.6 Dot Product of Vectors 615
- 7.7 Trigonometric Form of a Complex Number 625

Chapter 7 Summary 633

Review 7 Exercises 637

Chapter 7 Test 640

8

Systems of Equations and Inequalities 641



- 8.1 Systems of Linear Equations and Inequalities in Two Variables 643
- 8.2 Systems of Linear Equations in Three Variables 657
- 8.3 Solving Systems of Equations Using Matrices 667
- **8.4** Operations on Matrices **681**
- 8.5 Matrices and Inverses 691
- 8.6 Determinants and Cramer's Rule 701
- 8.7 Partial Fractions 709
- 8.8 Systems of Nonlinear Equations 717

Chapter 8 Summary 725

Review 8 Exercises 729

Chapter 8 Test 733

9 Conic Sections 735



- 9.1 The Parabola 737
- 9.2 The Ellipse **751**
- 9.3 The Hyperbola 763
- 9.4 Rotation of Axes; General Form of Conic Sections 775
- 9.5 Polar Equations of Conic Sections 783
- 9.6 Parametric Equations 789

Chapter 9 Summary 797

Review 9 Exercises 801

Chapter 9 Test 804

More Topics in Algebra 807



- 10.1 Sequences 809
- 10.2 Sums of Terms of Sequences 819
- 10.3 General Sequences and Series 831
- 10.4 Counting Methods 839
- 10.5 Probability 849
- 10.6 The Binomial Theorem 859
- 10.7 Mathematical Induction 865

Chapter 10 Summary 871

Review 10 Exercises 875

Chapter 10 Test 879

Answers (Not included in preview edition)

Index (Not included in preview edition)