Contents

Preface x

1 Review of Basic Algebraic Concepts 1

1.1 Sets of Numbers and Interval Notation 3
1.2 Operations on Real Numbers 15
1.3 Simplifying Expressions 31
1.4 Linear Equations in One Variable 39
   Midchapter Review 51
1.5 Applications of Linear Equations in One Variable 52
1.6 Literal Equations and Applications to Geometry 64
1.7 Linear Inequalities in One Variable 73
1.8 Properties of Integer Exponents and Scientific Notation 84
   Summary 94
   Review Exercises 101
   Test 105

2 Linear Equations in Two Variables 107

2.1 The Rectangular Coordinate System and Midpoint Formula 109
2.2 Linear Equations in Two Variables 118
2.3 Slope of a Line 132
   Midchapter Review 144
2.4 Equations of a Line 145
2.5 Applications of Linear Equations and Graphing 158
   Summary 172
   Review Exercises 177
   Test 180
   Cumulative Review 183
3 Systems of Linear Equations

Preview 186
3.1 Solving Systems of Linear Equations by Graphing 187
3.2 Solving Systems of Equations by Using the Substitution Method 197
3.3 Solving Systems of Equations by Using the Addition Method 203
Midchapter Review 210
3.4 Applications of Systems of Linear Equations in Two Variables 210
3.5 Systems of Linear Equations in Three Variables and Applications 219
3.6 Solving Systems of Linear Equations by Using Matrices 228
Summary 237
Review Exercises 243
Test 245
Cumulative Review 247

4 Introduction to Relations and Functions

Preview 250
4.1 Introduction to Relations 251
4.2 Introduction to Functions 259
4.3 Graphs of Basic Functions 272
4.4 Variation 283
Summary 292
Review Exercises 296
Test 299
Cumulative Review 301

5 Polynomials

Preview 304
5.1 Addition and Subtraction of Polynomials and Polynomial Functions 305
5.2 Multiplication of Polynomials 315
5.3 Division of Polynomials 325
Midchapter Review 335
5.4 Greatest Common Factor and Factoring by Grouping 336
5.5 Factoring Trinomials 345
5.6 Factoring Binomials 360
5.7 Solving Equations Using the Zero Product Rule 370
  Summary 384
  Review Exercises 389
  Test 393
  Cumulative Review 394

6 Rational Expressions and Rational Equations 397
  Preview 398
  6.1 Rational Expressions and Rational Functions 399
  6.2 Multiplication and Division of Rational Expressions 411
  6.3 Addition and Subtraction of Rational Expressions 416
    Midchapter Review 426
  6.4 Complex Fractions 427
  6.5 Rational Equations 435
  6.6 Applications of Rational Equations and Proportions 443
    Summary 453
    Review Exercises 458
    Test 460
    Cumulative Review 461

7 Radicals and Complex Numbers 465
  Preview 466
  7.1 Definition of an \( n \)-th Root 467
  7.2 Rational Exponents 480
  7.3 Simplifying Radical Expressions 488
    Midchapter Review 495
  7.4 Addition and Subtraction of Radicals 495
  7.5 Multiplication of Radicals 502
  7.6 Rationalization 510
  7.7 Radical Equations 518
  7.8 Complex Numbers 529
    Summary 540
    Review Exercises 545
    Test 549
    Cumulative Review 550
8 Quadratic Equations and Functions

Preview 554
8.1 Square Root Property and Completing the Square 555
8.2 Quadratic Formula 564
8.3 Equations in Quadratic Form 578
Midchapter Review 585
8.4 Graphs of Quadratic Functions 586
8.5 Vertex of a Parabola and Applications 600
Summary 613
Review Exercises 617
Test 620
Cumulative Review Exercises 622

9 More Equations and Inequalities

Preview 626
9.1 Compound Inequalities 627
9.2 Polynomial and Rational Inequalities 636
Midchapter Review 648
9.3 Absolute Value Equations 649
9.4 Absolute Value Inequalities 656
9.5 Linear Inequalities in Two Variables 668
Summary 683
Review Exercises 688
Test 692
Cumulative Review 693

10 Exponential and Logarithmic Functions

Preview 698
10.1 Algebra and Composition of Functions 699
10.2 Inverse Functions 707
10.3 Exponential Functions 718
10.4 Logarithmic Functions 729
Midchapter Review 743
10.5 Properties of Logarithms 744
10.6 The Irrational Number, e 753
10.7 Exponential and Logarithmic Equations 767
### Conic Sections

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preview</td>
<td>802</td>
</tr>
<tr>
<td>11.1 Distance Formula and Circles</td>
<td>803</td>
</tr>
<tr>
<td>11.2 More on the Parabola</td>
<td>812</td>
</tr>
<tr>
<td>11.3 The Ellipse and Hyperbola</td>
<td>821</td>
</tr>
<tr>
<td>Midchapter Review</td>
<td>830</td>
</tr>
<tr>
<td>11.4 Nonlinear Systems of Equations in Two Variables</td>
<td>831</td>
</tr>
<tr>
<td>11.5 Nonlinear Inequalities and Systems of Inequalities</td>
<td>840</td>
</tr>
<tr>
<td>Summary</td>
<td>849</td>
</tr>
<tr>
<td>Review Exercises</td>
<td>854</td>
</tr>
<tr>
<td>Test</td>
<td>857</td>
</tr>
<tr>
<td>Cumulative Review Exercises</td>
<td>859</td>
</tr>
</tbody>
</table>

### Additional Topics Appendix

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1 Binomial Expansions</td>
<td>A-1</td>
</tr>
<tr>
<td>A.2 Determinants and Cramer’s Rule</td>
<td>A-8</td>
</tr>
<tr>
<td>A.3 Sequences and Series</td>
<td>A-19</td>
</tr>
<tr>
<td>A.4 Arithmetic and Geometric Sequences and Series</td>
<td>A-28</td>
</tr>
<tr>
<td>Student Answer Appendix</td>
<td>A-43</td>
</tr>
</tbody>
</table>