

*Preface, xi*

## **Chapter 1**      **Functions, 1**

- 1.1      *Models of Functions, 1*
- 1.2      *Sets and the Types of Functions, 4*
  - Sets, 5
  - Types of Functions, 5
  - Domain and Range, 7
- 1.3      *Evaluation of Functions, 10*
- 1.4      *Operations on Functions, 14*

### **Exercises**

- 1.1      *Models of Functions, 20*
- 1.2      *Sets and the Types of Functions, 21*
- 1.3      *Evaluation of Functions, 22*
- 1.4      *Operations On Functions, 22*

## **Chapter 2**      **Rational Functions, Equations, and Inequalities, 23**

- 2.1      *The Domain and Range of Rational Functions, 23*
- 2.2      *Graphs of Rational Functions, 28*
  - Point by Point Plotting, 29
  - Using Intercepts, Zeroes, and Asymptotes, 30
- 2.3      *Rational Equations and Their Applications, 37*
  - Solutions of Rational Equations, 38
  - Real-Life Applications, 40
- 2.4      *Rational Inequalities and Their Applications, 43*
  - Solutions to Rational Inequalities, 44
  - Applications of Rational Inequalities, 48

### **Exercises**

- 2.1      *The Domain and Range of Rational Functions, 51*
- 2.2      *Graphs of Rational Functions, 52*
- 2.3      *Rational Equations and Their Applications, 52*
- 2.4      *Rational Inequalities and Their Applications, 54*

**Chapter 3 Inverse Functions, 57**

- 3.1 *One-to-One Functions, 58*
- 3.2 *Defining Inverse Functions, 61*
  - The Image and Preimage of a Function, 62
  - Finding the Inverse of a Function, 63
  - Defining Inverse Functions
    - Using Compositions of Functions, 65
- 3.3 *The Domain and Range of an Inverse Function, 67*
  - Solving for the Domain or Range of an Inverse Function, 68
  - Comparing the Domains of a Function and its Inverse, 69
  - Finding Inverses Given Restricted Domains, 70
- 3.4 *Graphing Inverse Functions, 72*
- 3.5 *Applications of Inverse Functions, 76*

**Exercises**

- 3.1 *One-to-One Functions, 79*
- 3.2 *Defining Inverse Functions, 80*
- 3.3 *The Domain and Range of an Inverse Function, 81*
- 3.4 *Graphing Inverse Functions, 81*
- 3.5 *Applications of Inverse Functions, 83*

**Chapter 4 Exponential Functions, Equations, and Inequalities, 85**

- 4.1 *Defining Exponential Functions, 86*
- 4.2 *Graphs of Exponential Functions, 89*
- 4.3 *Exponential Equations, 91*
- 4.4 *Exponential Inequalities, 94*
- 4.5 *Applications of Exponential Functions, 97*
  - Population, 98
  - Compound Interest, 100
  - Exponential Growth, 101
  - Exponential Decay, 103

**Exercises**

- 4.1 *Defining Exponential Functions, 105*
- 4.2 *Graphs of Exponential Functions, 106*
- 4.3 *Exponential Equations, 108*
- 4.4 *Exponential Inequalities, 108*
- 4.5 *Applications of Exponential Functions, 109*

## **Chapter 5** Logarithmic Functions, Equations, and Inequalities, 111

- 5.1 *Logarithmic Functions, 112*
  - Relating Logarithms and Exponential Functions, 112
  - The Domain and Range of Logarithmic Functions, 114
- 5.2 *Graphs of Logarithmic Functions, 118*
- 5.3 *Laws of Logarithms, 120*
- 5.4 *Common and Natural Logarithms, 122*
  - Properties of Common and  
Natural Logarithms, 123
- 5.5 *Logarithmic Equations, 125*
- 5.6 *Solving Exponential Equations  
Using Logarithms, 127*
- 5.7 *Logarithmic Inequalities, 131*
- 5.8 *Applications of Logarithmic Functions, 134*
  - Radioactive Decay, 135
  - Earthquakes and the Richter Scale, 136
  - pH Levels, 138
  - Sound Intensity, 138

### **Exercises**

- 5.1 *Logarithmic Functions, 139*
- 5.2 *Graphs of Logarithmic Functions, 141*
- 5.3 *Laws of Logarithms, 143*
- 5.4 *Common and Natural Logarithms, 144*
- 5.5 *Logarithmic Equations, 144*
- 5.6 *Solving Exponential Equations Using Logarithms, 145*
- 5.7 *Logarithmic Inequalities, 145*
- 5.8 *Applications of Logarithmic Functions, 146*

## **Chapter 6** Simple and Compound Interest, 147

- 6.1 *Simple Interest, 148*
  - Defining Simple Interest, 148
  - Ordinary and Exact Interest, 150
  - Promissory Note, 152
  - Computing the Daily Interest Factor, 153
  - Manipulating the Simple Interest Formula, 153
- 6.2 *Maturity Value, 155*
- 6.3 *Compound Interest and Compound Amount, 157*
  - Comparing Simple Interest and Compound Interest, 158
  - Finding the Compound Interest Rate, 159
  - Finding the Total Number of Compounding Periods, 159
- 6.4 *Calculating the Present Value in a Compound Interest, 161*

**Exercises**

- 6.1 *Simple Interest, 162*
- 6.2 *Maturity Value, 163*
- 6.3 *Compound Interest and Compound Amount, 163*
- 6.4 *Calculating the Present Value in a Compound Interest, 164*

**Chapter 7 Simple and General Annuities, 165**

- 7.1 *Present and Future Values of Ordinary Annuities, 165*
  - Simple Annuity and General Annuity, 166
  - Ordinary Annuity, Annuity Due, and Deferred Annuity, 166
  - Present and Future Values, 166
- 7.2 *Future and Present Values of Annuity Due, 170*
- 7.3 *Deferred Annuity, 172*
- 7.4 *General Annuities, 175*

**Exercises**

- 7.1 *Present and Future Values of Ordinary Annuities, 179*
- 7.2 *Future and Present Values of Annuity Due, 180*
- 7.3 *Deferred Annuity, 181*
- 7.4 *General Annuities, 183*

**Chapter 8 Stocks and Bonds, 185**

- 8.1 *Stocks, 186*
  - The Basics of Stocks, 186
  - Kinds of Stocks and Their Dividends, 187
- 8.2 *Market Indices for Stocks, 190*
  - Stock Yields, 191
  - Current Yield, 191
  - Price-Earnings Ratio and Earnings per Share, 192
  - Rate of Return on a Stock Investment, 193
- 8.3 *Bonds and Their Market Indices, 196*
  - Market Indices for Bonds, 197

**Exercises**

- 8.1 *Stocks, 199*
- 8.2 *Market Indices for Stocks, 200*
- 8.3 *Bonds and Their Market Indices, 201*

**Chapter 9 Loans and Amortization, 203**

- 9.1 *Loans, 203*
  - Promissory Notes, 204
  - Annual Percentage Rate, 206

- 9.2 *Amortization, 208*
- 9.3 *Mortgage, 213*
  - Qualifying for a Mortgage, 213
  - Mortgage Amount and Closing Costs, 214
  - Monthly Payments and Interest, 215
  - Refinancing a Loan, 216

### **Exercises**

- 9.1 *Loans, 218*
- 9.2 *Amortization, 219*
- 9.3 *Mortgage, 221*

## **Chapter 10 Simple and Compound Propositions, 223**

- 10.1 *Propositions, 224*
- 10.2 *Simple and Compound Propositions, 226*
- 10.3 *Symbolizing Propositions, 230*
  - Denoting a Proposition, 230
  - Parentheses, 232
- 10.4 *Truth Values of Propositions, 236*
  - Truth Tables of Other Logical Operators, 238
  - Primary and Secondary Logical Operators, 240
- 10.5 *Forms of Conditional Propositions, 245*

### **Exercises**

- 10.1 *Propositions, 249*
- 10.2 *Simple and Compound Propositions, 249*
- 10.3 *Symbolizing Propositions, 250*
- 10.4 *Truth Values of Propositions, 251*
- 10.5 *Forms of Conditional Propositions, 252*

## **Chapter 11 Special Forms of Propositions, 253**

- 11.1 *Tautologies, 253*
  - Defining Tautologies, 254
  - Tautologies and Rules of Logical Inference, 256
  - Tautologies and Rules of Replacement, 259
- 11.2 *Fallacies, 263*
  - Defining a Fallacy, 264
  - Types of Fallacy, 264
- 11.3 *Categorical Syllogisms, 268*
  - Inductive and Deductive Reasoning, 269
  - Defining Categorical Syllogisms, 269
  - Venn Diagrams and Categorical Syllogisms, 270

- Universal Affirmative Syllogisms, 272
- Universal Negative Syllogisms, 273
- Particular Affirmative Syllogisms, 274
- Particular Negative Syllogisms, 274
- Combinations of Categorical Syllogisms, 275

11.4 *Validity of Real-Life Arguments, 277*

### **Exercises**

- 11.1 *Tautologies, 282*
- 11.2 *Fallacies, 283*
- 11.3 *Categorical Syllogisms, 283*
- 11.4 *Validity of Real-Life Arguments, 285*

## **Chapter 12 Methods of Proof and Mathematical Statement, 287**

- 12.1 *Proof by Direct Method, 288*
- 12.2 *Proof by Indirect Method, 292*
- 12.3 *Disproof by Indirect Proof, 295*
- 12.4 *Disproof by Counterexample, 300*
- 12.5 *Proofs of Mathematical Statements, 303*
  - Proof in Propositional Form, 303
  - Proof in Mathematical Form, 304

### **Exercises**

- 12.1 *Proof by Direct Method, 307*
- 12.2 *Proof by Indirect Method, 307*
- 12.3 *Disproof by Indirect Method, 308*
- 12.4 *Disproof by Counterexample, 308*
- 12.5 *Proofs of Mathematical Statements, 309*

*Glossary, 311*

*Bibliography, 321*

*Index, 323*