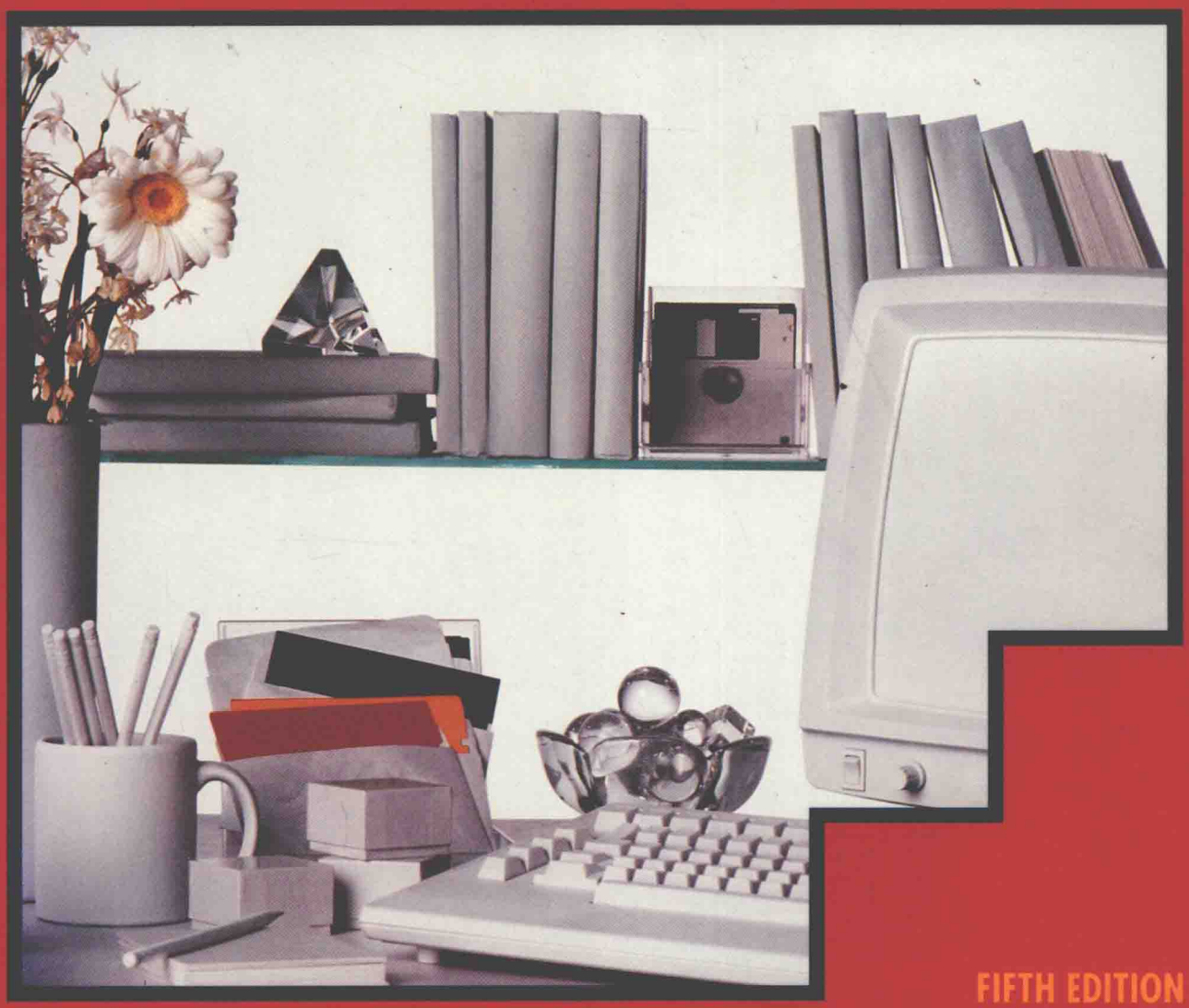
BUSINESS AND CONSUMER MATHEMATICS



FIFTH EDITION

LANGE/ROUSOS

BUSINESS AND CONSUMER MATHEMATICS

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Fifth Edition

IRWIN

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BUSINESS AND CONSUMER MATHEMATICS

To our wives
Donna and Irene

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Preface to the Students

The world in which we live is constantly changing. Since the previous edition of this text was published, we have seen the rise and fall of junk bonds, the near collapse of the savings and loan industry, cuts in some taxes and raises in others, and many other major financial events that affect business and consumer mathematics. In this world, you cannot afford *not* to understand the mathematics on which business and consumer decisions are built. With this text, we want to actively involve you in the learning process while presenting the broad applications of mathematics in business and in your decisions as a consumer. A large number of illustrations have been drawn from actual wholesale and retail establishments, banks, consumer finance companies, insurance firms, and manufacturers.

This text was written to help you learn. The following special features were designed with your needs as a student in mind.

Learning Objectives Each section begins with objectives indicating what you should be able to do after completing the section.

Example/Solution Each section has one or more examples followed by detailed solutions.

Calculator Solutions Many of the sample problems have solutions showing how to solve the problem using a calculator. Keystrokes for a typical calculator are shown following the application.

Self-Review At appropriate points in each section, we have placed Self-Reviews. These give you an opportunity to work problems similar to the section material, and they serve to reinforce your understanding of the preceding material. Answers and the methods of solution are given at the end of each Self-Review.

Section Assignments A set of questions and problems follows each section. Your instructor may assign these as homework. If not, you should try them on your own to reinforce the skills and concepts you have learned in that section. Enough space is left on the pages so that you can work the problems on the page. The pages are perforated and can be torn out if your instructor assigns them as homework. The answers and methods of solution to the odd-numbered questions are in Appendix C so you can check your answers and the procedures.

Chapter Summary A chapter summary follows each chapter. It references page numbers with concepts, formulas, and examples.

Problems for Chapter A review assignment appears at the end of each chapter. A wide variety of problems covers all of the material in the chapter. These are also perforated. If you have difficulty with any of the questions, you can look to the chapter summary for a formula and example that will help you.

Test Yourself A self-review test is provided for every chapter. You should try to work the questions on this review to evaluate your understanding of the chapter. You should work on this as if it were a real test. The answers and methods of solution to all the problems are in Appendix C. If you have difficulty with any Test Yourself questions you can then look to the chapter or see your instructor for additional help.

Vocabulary Review Each Test Yourself contains a Vocabulary Review. This is designed to help you review the terminology of business and consumer mathematics.

Spreadsheet Applications

Businesses as well as individuals are relying increasingly on personal computers to perform many tasks. Your career options will be broader if you have knowledge of this resource. The ad at the left illustrates this point. With this in mind, we have incorporated two forms of spreadsheet applications at the end of each chapter. These spreadsheets illustrate the power and versatility of the computer in performing many of the operations in the chapter. If you have access to a personal computer and a spreadsheet, these will be valuable learning tools.

ACCOUNTING CLERK

We are looking for an individual to work in our Accounting Department at our corporate office in Brookfield. Duties will include AP/AR auditing of branch activity, bank and general ledger reconciliation, and reporting.

Computer experience is a must, particularly with Lotus. Good communication skills are required. A two (2) year Accounting degree is preferred, however advanced accounting course work will be considered.

We offer a complete benefit package including Health/Dental, 401(k), Pension Plan and paid vacation.

Cumulative Reviews

Mathematics is not like riding a bicycle. If you do not practice previously learned skills, you will find that they are lost or very rusty. Therefore, we have included cumulative reviews at appropriate places. Generally, they follow every third chapter. They are designed to reinforce skills from earlier chapters. They will also be useful in reviewing for tests. Again the answers and methods of solution are given in Appendix C.

There are several learning aids that accompany this text to further enhance your skills and understanding. Ask your instructor for information on how to obtain these supplements.

Business and Consumer Mathematics Action Pack

This supplement contains several activities that your instructor may assign. Examples of activities include keeping a company payroll, planning a budget, and keeping track of stock and bond values.

Business and Consumer Mathematics Tutorial Software

This software provides a valuable opportunity to practice your skills in answering problems in the text. It includes questions for each section of the text which are similar to the review questions for that section. The software provides feedback on wrong answers and suggestions for further study in the text.

Business and Consumer Mathematics Video Tapes

This tutorial video tape provides another valuable opportunity to review the concepts and procedures in each section of the text. The video tapes provide an explanation of the examples and Self-Reviews, along with a special emphasis on common student errors.

Business and Consumer Mathematics Spreadsheet Applications

A diskette is available to help you in further exploring the spreadsheet applications in each chapter. The diskette contains templates for each spreadsheet application.

We hope that these features and supplements will help you learn business and consumer mathematics and then apply these skills in business and in your personal life.

Walter H. Lange
Temoleon G. Rousos

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Finally, our eternal gratitude to Donna T. Lange for her word processing expertise and for keeping our manuscript organized, legible, and meaningful.

Although guarantees are not made, the student-oriented, consistently formatted textbook with self-reviews, chapter summaries, test yourself, and spreadsheets; the teacher's annotated edition with marginal notes to the teacher; the instructor's lecture guide with hints and suggestions gathered from many years of teaching; and the tutorial software and the tutorial videos come as close as possible to guaranteeing success to both you and the students.

W. H. L.
T. G. R.

Contents

1. A Brief Review of Basic Computations 1

1-1 Computations with Whole Numbers and Decimals, 1
Introduction, 1
Place Value, 2
Addition, 3
Subtraction, 4
Adding and Subtracting, 5
Multiplication, 6
Division, 7
Rounding, 9
Estimation, 10
Section Assignment 1-1, 11

1-2 Checking Accounts, 13
Writing and Recording Checks, 13
Recording Checks and Deposits, 14
Reconciling the Bank Statement, 16
Special Checking Accounts, 17
Section Assignment 1-2, 19

1-3 Computations with Fractions, 21
Fractions, 21
Adding Fractions, 21
Subtracting Fractions, 22
Reducing Fractions, 23
Mixed Numbers, 23
Multiplying Fractions, 24
Dividing Fractions, 25
Multiplying and Dividing Mixed Numbers, 25
Converting Fractions to Decimals, 27
Converting Decimals to Fractions, 27
Section Assignment 1-3, 29

Chapter Summary, 31
Spreadsheet Applications Introduction, 32
Spreadsheet Applications for Chapter 1, 34
Problems for Chapter 1, 37
Test Yourself/Vocabulary Review, 39

2. Percents 41

2-1 Percent Decimal Conversions, 41
Converting a Percent to a Decimal, 42
Converting a Decimal to a Percent, 42
Section Assignment 2-1, 45

2-2 Percent Fraction Conversions, 47
Converting a Percent to a Fraction, 47
Converting a Fraction to a Percent, 48
Fractional Percents, 49
Fraction, Percent, Decimal Equivalents, 50
Section Assignment 2-2, 51

Chapter Summary, 53
Spreadsheet Applications for Chapter 2, 53
Problems for Chapter 2, 57
Test Yourself/Vocabulary Review, 59

3. Percentages 61

3-1 Portion, Rate, and Base, 61
Base, Rate, and Portion, 61
Calculating the Portion, 62
Solving for the Unknown, 63
Calculating the Rate, 64
Calculating the Base, 65
Section Assignment 3-1, 67

3-2 Rate of Increase or Decrease, 69
Rate of Increase, 69
Rate of Decrease, 70
Section Assignment 3-2, 71

Chapter Summary, 73
Spreadsheet Applications for Chapter 3, 74
Problems for Chapter 3, 77
Test Yourself/Vocabulary Review, 79

Cumulative Review—Chapters 1, 2, 3, 81

4. Payroll 85

4-1 Income, 85
Gross Pay: Hourly Wages, 85
Gross Pay: Salary, 87
Gross Pay: Commission, 89
Incentive Pay, 92
Section Assignment 4-1, 93

4-2 Deductions, 95
Net Pay, 95
Federal Insurance Contributions Act (FICA) or Social Security Withholding, 96

Federal Income Tax (FIT), 98
Determining Federal Income Tax Withholding, 99
Determining State Income Tax Withholding, 99
Section Assignment 4-2, 103

4-3 Employers' Records, 105
Workers' Compensation Insurance, 105
Unemployment Insurance, 106
Payroll Register, 107
Section Assignment 4-3, 109

Chapter Summary, 111
Spreadsheet Applications for Chapter 4, 112
Problems for Chapter 4, 115
Test Yourself/Vocabulary Review, 117

5. Taxes 119

5-1 Sales Taxes, 119
Straight Sales Tax, 119
Solving for the Selling Price, 123
Section Assignment 5-1, 125

5-2 Property Taxes, 127
Market Value and Assessed Value, 127
Tax Rate, 128
Determining the Property Tax, 129
Computing the Tax Rate, 130
Section Assignment 5-2, 131

Chapter Summary, 133
Spreadsheet Applications for Chapter 5, 133
Problems for Chapter 5, 137
Test Yourself/Vocabulary Review, 139

6. Consumer Spending 141

6-1 Unit Pricing—Comparison Shopping, 141
Introduction, 141
Unit Pricing, 141
Universal Product Code, 145
Section Assignment 6-1, 147

6-2 Cost of Transportation, 149
Costs of Owning and Operating an Automobile, 149
Renting an Automobile (Mileage Charge), 150
Renting an Automobile (Unlimited Mileage), 152
Section Assignment 6-2, 153

6-3 Budgeting, 155
Allocations, 156
Budget Analysis, 156
Section Assignment 6-3, 159

Chapter Summary, 161
Spreadsheet Applications for Chapter 6, 161
Problems for Chapter 6, 165
Test Yourself/Vocabulary Review, 167

Cumulative Review Chapters 4, 5, 6, 169

7. Simple Interest 173

7-1 Simple Interest, 173
Determining Interest, 173
Exact Time, 175
Exact Time Using a Table, 176
Due Date of a Loan When Time is in Months, 177
Due Date of a Loan When Time is in Days, 178
Computing the Amount of Interest on a Loan, 179
Section Assignment 7-1, 181

7-2 Determining Principal, Rate, and Time, 183
Review of Solving for the Unknown, 183
Determining the Principal, 183
Determining the Rate of Interest, 185
Determining the Time, 186
Section Assignment 7-2, 189

Chapter Summary, 191
Spreadsheet Applications for Chapter 7, 191
Problems for Chapter 7, 195
Test Yourself/Vocabulary Review, 197

8. Compound Interest and Annuities 199

8-1 Compound Interest, 199
Computing Compound Interest, 199
Compound Interest Using Tables, 200
Daily Compounding, 203
Annual Yield, 205
Present Value, 206
Optional: The Compound Interest Formula, 207
Section Assignment 8-1, 211

8-2 Annuities and Sinking Funds, 213
Ordinary Annuity, 213
Annuity Due, 215
Sinking Fund, 216
Section Assignment 8-2, 219

Chapter Summary, 221
Spreadsheet Applications for Chapter 8, 222
Problems for Chapter 8, 225
Test Yourself/Vocabulary Review, 227

9. Promissory Notes, Discounting, and Partial Payment 229

9-1 Promissory Notes and Discounting, 229

Promissory Notes, 229
Discounting an Interest-Bearing Note, 230
Discounting a Noninterest Bearing Note, 233
Establishing a Line of Credit, 234
Section Assignment 9-1, 235

9-2 Partial Payment, 237

The United States Rule, 237
Section Assignment 9-2, 239

Chapter Summary, 241
Spreadsheet Applications for Chapter 9, 242
Problems for Chapter 9, 245
Test Yourself/Vocabulary Review, 247

Cumulative Review Chapters 7, 8, 9, 249

10. Consumer Credit—Charge Accounts 251

10-1 The Previous-Balance and the Adjusted-Balance Methods of Determining the Finance Charge, 251

Introduction, 251
Previous-Balance Method of Computing Finance Charges, 252
Adjusted-Balance Method of Computing Finance Charges, 254
Section Assignment 10-1, 257

10-2 Average Daily Balance Method, 259

Average Daily Balance Method, 259
Optional: Previous Finance Charges Excluded, 261
Section Assignment 10-2, 265

Chapter Summary, 267
Spreadsheet Applications for Chapter 10, 267
Problems for Chapter 10, 271
Test Yourself/Vocabulary Review, 273

11. Consumer Credit—Installment Credit 275

11-1 Cost of Installment Credit, 275

Determining the Amount of Each Payment on Installment Loans, 276
Determining the Annual Percentage Rate (APR) on Installment Loans, 278
Technical Note on Annual Percentage Rate, 280
Consumer Choices, 281
Section Assignment 11-1, 283

11-2 Simple Interest Installment Loans (SIIL), 285

Determining the Monthly Payment, 285
Payment for Interest, Principal, and New Balance, 286
Final Payment on a SIIL, 288
Finance Charge on a SIIL, 290
The APR on a SIIL, 290
Section Assignment 11-2, 291

11-3 Refund of Finance Charge—The Rule of 78, 293

Introduction, 293
Determining the Amount of the Refund (Unearned Finance Charge), 294
Section Assignment 11-3, 299

Chapter Summary, 301
Spreadsheet Applications for Chapter 11, 302
Problems for Chapter 11, 305
Test Yourself/Vocabulary Review, 307

12. Mortgage Loans 309

12-1 Financing the Purchase of a Home or Commercial Property, 309

Introduction, 309
Determining the Monthly Payment, 309
Payment for Interest, Principal, and New Balance, 311
Adjustable Rate Mortgages (ARM), 313
Section Assignment 12-1, 317

12-2 More on Financing the Purchase of a Home, 319

Importance of the Interest Rate, 319
Importance of the Length of Time of the Loan, 320
Importance of the Monthly Payment, 321
Biweekly Payments, 322
Closing or Settlement Costs, 325
Escrow Accounts, 325
Section Assignment 12-2, 327

12-3 Buying or Renting a Home, 329

Qualifying for a Mortgage, 329
Renting a Home, 329
Secton Assignment 12-3, 331

Chapter Summary, 333
Spreadsheet Applications for Chapter 12, 334
Problems for Chapter 12, 337
Test Yourself/Vocabulary Review, 339

13. Insurance 341

13-1 Home Insurance, 341

Introduction, 341
Amount of Coverage, 343
Policy Exclusions, 344
Factors Determining the Premium, 344
Premium Credits, 346

此为试读,需要完整PDF请访问: www.ertongbook.com

Coinsurance, 347
Related Insurance, 349
Section Assignment 13-1, 351

13-2 Life Insurance, 353
Types of Life Insurance, 353
Term Insurance, 353
Straight Life Insurance, 353
Limited-Payment Life, 353
Endowment Insurance, 353
Life Insurance Premiums, 354
Semiannual, Quarterly, and Monthly Premiums, 355
Universal Life Insurance, 356
Universal Life Premiums, 357
Section Assignment 13-2, 359

13-3 Automobile Insurance, 361
Basic Coverages, 361
Optional Coverages, 362
Automobile Insurance Premiums, 362
Rating Factors, 362
Semiannual Premium, 364
No-Fault Auto Insurance, 366
Section Assignment 13-3, 367

Chapter Summary, 369
Spreadsheet Applications for Chapter 13, 370
Problems for Chapter 13, 373
Test Yourself/Vocabulary Review, 375

Cumulative Review Chapters 10, 11, 12, 13, 377

14. Analysis for Financial Statements 381

14-1 The Balance Sheet, 381
Introduction, 381
Assets, 381
Liabilities, 382
Owner Equity, 382
Vertical Analysis, 383
Horizontal Analysis, 384
Section Assignment 14-1, 387

14-2 Income Statements, 389
Income Statement, 389
Vertical Analysis, 391
Horizontal Analysis, 392
Section Assignment 14-2, 393

14-3 Ratio Analysis, 395
Ratio Analysis, 395
Current Ratio, 395
Acid Test Ratio, 395
Return on Owner Investment, 395
Section Assignment 14-3, 399

Chapter Summary, 401
Spreadsheet Applications for Chapter 14, 402
Problems for Chapter 14, 405
Test Yourself/Vocabulary Review, 407

15. Business Expenses 409

15-1 Advertising Expenses, 409
Introduction, 409
Newspaper Advertising, 409
Television Advertising, 411
Section Assignment 15-1, 415

15-2 Business Insurance, 417
Factors Affecting the Premium, 418
Retail Class, 419
Business Liability Insurance, 420
Total Annual Premium, 421
Section Assignment 15-2, 423

15-3 Motor Freight and Air Freight Costs, 425
Motor Freight Costs, 425
Air Freight Costs, 427
Section Assignment 15-3, 429

Chapter Summary, 431
Spreadsheet Applications for Chapter 15, 432
Problems for Chapter 15, 435
Test Yourself/Vocabulary Review, 437

Cumulative Review Chapters 14, 15, 439

16. Trade and Cash Discounts 441

16-1 Trade Discounts, 441
Trade Discount, 441
Net Price, 442
Complement Method for Computing Net Price, 443
Rate of Discount, 444
Chain Discounts, 445
Complement Method for Computing Net Price with Chain Discounts, 445
Section Assignment 16-1, 447

16-2 Cash Discounts, 449
Invoices, 449
Cash Discounts, 450
Ordinary Dating, 450

End-of-Month Dating, 452
Receipt-of-Goods Dating, 453
Borrowing for Cash Discounts, 454
Section Assignment 16-2, 457

Chapter Summary, 459
Spreadsheet Applications for Chapter 16, 461
Problems for Chapter 16, 463
Test Yourself/Vocabulary Review, 465

17. Markup and Markdown 467

17-1 Markup Based on Cost, 467
The Basic Retailing Equation, 467
The Basic Retailing Equation Expressed as Percents of the Cost, 469
Determining the Selling Price Given Cost and Markup Based on the Cost, 470
Section Assignment 17-1, 473

17-2 Markup Based on Selling Price, 475
The Basic Retailing Equation Expressed as Percents of the Selling Price, 475
Determining the Selling Price Given Cost and Markup as a Percent of the Selling Price, 476
Section Assignment 17-2, 479

17-3 Markdown, 481
Markdown, 481
Percent Markdown, 481
Sale Price, 482
Section Assignment 17-3, 485

Chapter Summary, 487
Spreadsheet Applications for Chapter 17, 488
Problems for Chapter 17, 491
Test Yourself/Vocabulary Review, 493

18. Depreciation 495

18-1 Straight-Line Method, 495
Introduction, 495
Straight-Line Method, 496
Units of Production Method, 498
Section Assignment 18-1, 499

18-2 Sum-of-the-Years'-Digits Method, 501
Sum-of-the-Years'-Digits Method, 501
Section Assignment 18-2, 503

18-3 The Declining-Balance Method, 505
The Declining-Balance Method, 505
Section Assignment 18-3, 511

18-4 Accelerated Cost Recovery System (ACRS) and Modified Accelerated Cost Recovery System (MACRS), 513
Accelerated Cost Recovery System (ACRS), 513
Modified Accelerated Cost Recovery System (MACRS), 515
Section Assignment 18-4, 519

Chapter Summary, 521
Spreadsheet Application for Chapter 18, 522
Problems for Chapter 18, 525
Test Yourself/Vocabulary Review, 527

19. Valuing an Inventory and Inventory Turnover 529

19-1 Valuing an Inventory Using the Average-Cost Method, and Specific Identification Method, 529
Introduction, 529
Average-Cost Method, 530
Specific Identification Method, 532
Section Assignment 19-1, 533

19-2 Valuing an Inventory Using the First-In, First-Out (FIFO) Method, 535
FIFO Method, 535
Section Assignment 19-2, 537

19-3 Valuing an Inventory Using the Last-In, First-Out (LIFO) Method, 539
LIFO Method, 539
Which Method Should Be Used? 539
Section Assignment 19-3, 543

19-4 Rate of Inventory Turnover, 545
Inventory Turnover Based on Cost, 545
Inventory Turnover Based on Retail Sales, 546
Section Assignment 19-4, 549

Chapter Summary, 551
Spreadsheet Applications for Chapter 19, 551
Problems for Chapter 19, 555
Test Yourself/Vocabulary Review, 557

Cumulative Review Chapters 16, 17, 18, 19, 559

20. Statistical Techniques in Business 563

20-1 Graphic Presentation, 563
Introduction, 563
Line Charts, 564
Bar Charts, 566
Two-Directional Bar Charts, 567
Pie Chart, 568
Section Assignment 20-1, 571

20-2 Frequency Distributions, 573
Frequency Distribution, 573
Graphic Portrayal of a Frequency Distribution, 574
A Computer Application, 576
Section Assignment 20-2, 579

20-3 Averages, 581
Arithmetic Mean, 581
Median, 582
Mode, 583
Misuses of Statistics, 584
Section Assignment 20-3, 585

Chapter Summary, 587
Spreadsheet Applications for Chapter 20, 589
Problems for Chapter 20, 593
Test Yourself/Vocabulary Review, 595

21. Stocks and Bonds 597

21-1 Stocks, 597
Introduction, 597
Buying Stocks, 597
Selling Stocks, 599
Dividends, 600
Section Assignment 21-1, 601

21-2 Bonds, 603
Buying Bonds, 603
Annual Interest, 604
Annual Yield, 605
Selling Bonds, 606
Section Assignment 21-2, 607

Chapter Summary, 609
Spreadsheet Applications for Chapter 21, 609
Problems for Chapter 21, 613
Test Yourself/Vocabulary Review, 615

Cumulative Review Chapters 20, 21, 617

Cumulative Review Chapters 1-21, 619

Appendix A 631
The Metric System

A Brief History of Measurement, 629
Metric Distances (Lengths), 629
Volume, 632
Weight and Mass, 632
Temperature, 634
Conversions: Metric to U.S. Customary and U.S. Customary to Metric, 634

Problems for Appendix A, 637
Test Yourself, 639

Appendix B 641
Employment Test

Appendix C 643
Answers to Odd-Numbered Problems

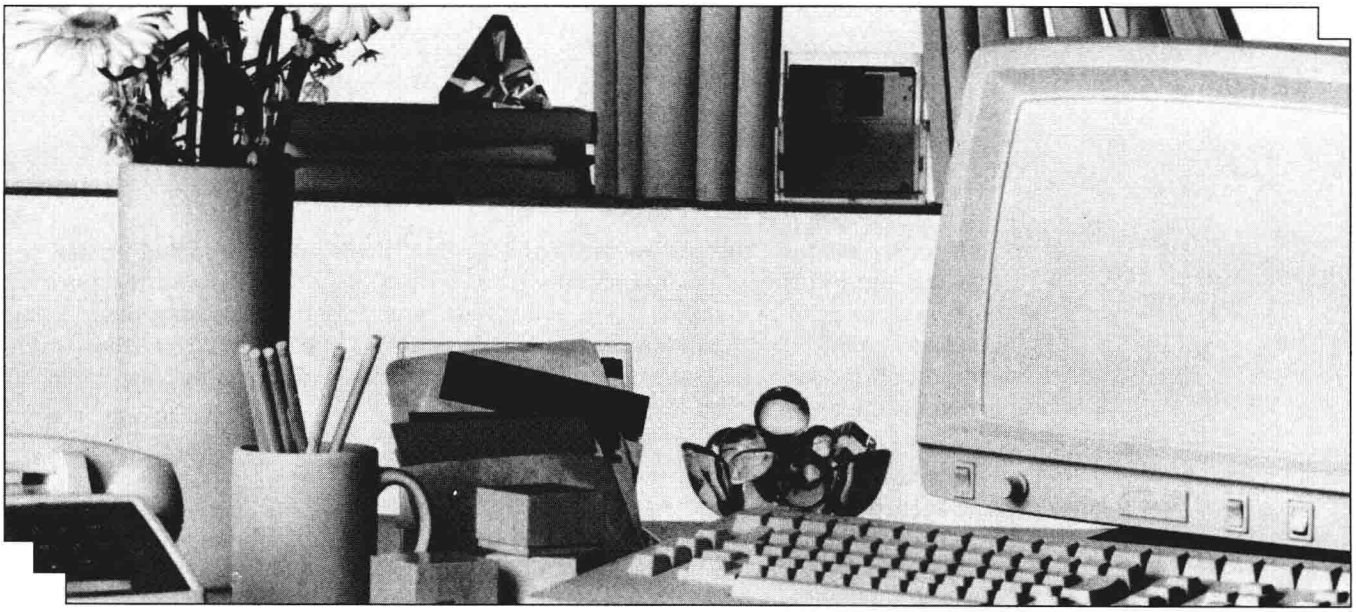
Appendix D 707
Tables and Exhibits

Glossary, 629

Index, 635

A BRIEF REVIEW OF BASIC COMPUTATIONS

1



SECTION 1-1 Computations with Whole Numbers and Decimals

When you have completed this section, you will be able to:

Add, subtract, multiply, and divide whole numbers and decimal numbers.
Round whole numbers and decimal numbers.

■ INTRODUCTION

Becoming a successful businessperson requires an understanding of the mathematics of business. Your success in the world of business depends on how well you comprehend payroll registers and payroll taxes, sales and property taxes, budgeting, commercial loans and sinking funds, promissory notes and discounting, the cost of credit, business insurance, financial statements, various business expenses, depreciation, valuation of inventory, discounts, markups and markdowns, statistical techniques for predicting and measuring success in business, and methods of issuing stocks and bonds.

Being an educated, enlightened consumer able to take advantage of all the ins and outs in today's economy requires an understanding of the mathematics of the marketplace (consumer mathematics). To live as an intelligent consumer, you need an understanding of gross pay, deductions, and net pay; market value, assessed value, and tax rates; unit price and comparison shopping; the cost of transportation and budgeting; interest and finance charges on charge accounts, credit cards, and installment loans; the power of compound interest and annuities; mortgage loans and interest paid; how to save on home, life, or auto insurance; and how to buy stocks and bonds. There is money to be saved out there in the economic jungle; one purpose of this course is to prepare you to do just that.

■ PLACE VALUE

The number system we use is based on *tens* and is called the *decimal place value* system. A decimal point separates the whole numbers (to the left of the decimal point) and the decimal numbers (to the right of the decimal point).

9 6 2 . 4 7

whole numbers ← ↑ → decimal numbers

decimal point

In the number above, read nine hundred sixty-two and forty-seven hundredths:

The 2 is in the ones place and equals	2 ×	1	= 2
The 6 is in the tens place and equals	6 ×	10	= 60
The 9 is in the hundreds place and equals	9 ×	100	= 900
The 4 is in the tenths place and equals	4 ×	0.1	= 0.4
The 7 is in the hundredths place and equals	7 ×	0.01	= 0.07
			962.47

In order to stress the placement of the decimal point in proofreading annual reports and other business documents, the word "point" may be used and the number above may be read as nine, six, two, point, four, seven. But, when using place value names, it is read nine hundred sixty-two and forty-seven hundredths. Note that *and* is used only to indicate the placement of the decimal point and that a hyphen is placed between the tens place and the ones place.

Example Write the following numbers using place value names: **A.** 78 **B.** 367.9 **C.** 8.94.

Solution

A. Seventy-eight

B. Three hundred sixty-seven and nine tenths

C. Eight and ninety-four hundredths

Most numbers encountered in business vary between billions and ten thousandths. The place value names and how they are read is indicated in the illustration that follows.

Billions	Hundred millions	Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones	Decimal point	Tenths	Hundredths	Thousandths	Ten thousandths
8	1	2	5	6	4	7	3	4	9	.	6	8	1	3

The number would be written as 8,125,647,349.6813. Note that for ease of reading, the whole numbers are in groups of three starting with the decimal point and moving to the left. This number would be read "eight billion, one hundred twenty-five million, six hundred forty-seven thousand, three hundred forty-nine and six thousand eight hundred thirteen ten thousandths."

Example Write the following numbers using place value names.
A. 1,675.84 **B.** 256.958 **C.** 0.0563 **D.** 42,710,548.05

Solution

A. One thousand, six hundred seventy-five and eighty-four hundredths

B. Two hundred fifty-six and nine hundred fifty-eight thousandths

C. Five hundred sixty-three ten thousandths

D. Forty-two million, seven hundred ten thousand, five hundred forty-eight and five hundredths

SELF-REVIEW

Cover the answers below before solving the following problems.
Write A, B, C using place value names and write D, E, F using numerals.

A. 6,245.8 _____

B. 57.106 _____

C. 19,062,493.0018 _____

D. Four hundred twenty-five and seventy-three hundredths

E. Four hundred twenty-eight ten thousandths

F. Thirty-three thousand, two hundred twenty-six and two thousand seven hundred forty-eight ten thousandths

Now uncover the answers below and check your answers.

A. Six thousand, two hundred forty-five and eight tenths

B. Fifty-seven and one hundred six thousandths

C. Nineteen million, sixty-two thousand, four hundred ninety-three and eighteen ten thousandths

D. 425.73

E. 0.0428

F. 33,226.2748

■ ADDITION

The operation of combining two or more arithmetical quantities into one sum is called **addition.** Addition is indicated by the plus sign (+). The usual practice when adding is to align the quantities vertically.

Example Several deposits to a checking account at the First National Bank were: $242.39, $3.08, $94.98, and $1,357.00. What is the total amount deposited?

Solution Write the numbers vertically; note that the decimal points must be aligned.

Deposit Date	Amount Deposited
	111 2
January 3.....	$ 242.39
January 8.....	3.08
February 27.....	94.98
April 9	1,357.00
Total	$1,697.45

The numbers in the extreme right column are summed first; that is, 9 + 8 + 8 + 0 = 25.

The 5 is entered in the total, and the 2 is *carried over* to the column to the left. The sum of that column, 2 + 3 + 0 + 9 + 0, is 14.

The 4 is entered in the total, and the 1 is carried over to the next column to the left.

This process is continued until all the columns have been totaled. The sum of the deposits is $1,697.45.

CALCULATOR:
242.39 [+] 3.08 [+] 94.98 [+] 1357 [=] 1697.45

A Note to the Student: As you progress through each chapter, there are self-review problems for you to solve. By doing each problem, you can determine *immediately* whether you have understood the preceding material. The answers to the problems are below the questions. *Cover them before solving the problems.*

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