519.5028 ELZ

			-							
			C	10	VI	'EI	N	^T S		
		~								

SECTION I. INTRODUCTORY STATISTICS 1

1. Introduction 3

Organization of the Book 4 What Is Statistics? 5 Statistics as a Tool of Research 6

2. Variables and Levels of Measurement 7

Types of Statistical Measures 7 Levels of Measurement 8 Types of Variables 12 Summarizing Data 13 Exercises 17

3. Measures of Central Tendency 19

The Mode 19 The Median 20 The Mean 22 The Sample Statistics Computer Program 26 Preparing Data Files 28 Exercises 30

4. Display of Data 32

Pie Charts 32 Bar Graphs 34 Bar Histograms 34 Frequency Polygons 36 Types of Distribution Curves 37 Exercises 39

.,;;

5. Populations and Samples 40

viii CONTENTS

Population 40 Sample 41 Exercises 43

6. Measures of Variability 44

The Range 44 The Average Deviation 45 The Variance 46 Degrees of Freedom 49 Exercises 51

7. The Normal Distribution 53

The Normal Curve 53 The *z* Score 57 Exercises 60

8. Probability 61

Exercises 65

9. The Distribution of Sample Means 66

Estimating the Standard Error of the Mean 68 Exercises 70

10. Establishing Confidence Intervals 72

The 95% Confidence Interval74The 99% Confidence Interval76The t Distribution77A Computer Application80Exercises82

11. Correlation 83

Computation of the Correlation Coefficient 88 Conclusion 91 Exercises 92

12. Regression 93

The Regression of Y on X 94 The Regression of X on Y 98 Multiple Regression 101 Exercises 104 **ix** CONTENTS

13. Introduction to Hypothesis Testing 107

Decisions Regarding the Null Hypothesis 109 Testing the Null Hypothesis 110 The Standard Error of the Difference between Means 111 Exercises 114

14. Testing for the Difference between Population Means 115

Testing the Difference between Independent Means—Variances Assumed Equal 116 Testing the Difference between Independent Sample Means—Variances Not Assumed Equal 122 Testing the Difference between Dependent Means 124 Exercises 127

15. Making Decisions about the Null Hypothesis 129

One- and Two-Tail Tests 130 Testing the Significance of a Correlation Coefficient 134 Directional versus Nondirectional Hypotheses 135 The Level of Significance 136 Type I and Type II Errors 137 The Power of Statistical Tests 138 Exercises 141

16. Analysis of Variance - One Way 143

The F Distribution 149 Test of Multiple Comparisons 152 The Tukey Method — Equal-Sized Samples 153 The Scheffé Method — Unequal-Sized Samples 155

17. Two-Way Analysis of Variance and Other Techniques 159

Two-Way Analysis of Variance 159 Analysis of Covariance 165 One-Way Analysis of Variance with Repeated Measures 168 Exercises 170

18. Chi-Square Tests 173

The Test for Goodness of Fit 174 The Test for Independence of Two Variables 180 The Test for Equality of Proportions 181 Exercises 184

19. Nonparametric Techniques - Ordinal Data 186

Spearman Rank Correlation 187 The Mann-Whitney U Test 192 The Wilcoxon Matched-Pairs Signed-Ranks Test 194 **X** CONTENTS The Kruskal-Wallis One-Way Analysis of Variance by Ranks Test 196 The Friedman Two-Way Analysis of Variance by Ranks 198 Exercises 200

> 231 237

SECTION II. USE OF THE COMPUTER PROGRAMS 203

A. Data File Preparation — #1 209
B. Data File Preparation — #2 212
C. Sample Statistics 214
D. Pearson Correlation (r) 218
E. Regression 221
F. Multiple Regression – Two Predictors 224
G. T Test-Independent Samples 226
H. T Test – Dependent Samples 229
I. One-Way ANOVA Independent Samples 2
J. Two-Way ANOVA Independent Samples 2
K. Analysis of Covariance 240
L. One-Way ANOVA Repeated Measures 243
M. Chi Square — Goodness of Fit 246
N. Chi Square—Independence/Proportions 248
O. Spearman Rank Correlation (rho) 250
P. Mann-Whitney U Test 253
Q. Wilcoxon Matched-Pairs Test 255
R. Kruskal-Wallis H Test 257
S. Friedman ANOVA for Ranks 259
Tables 261 Answers to Exercises 279 Glossary 295 Index 297