## Contents

	Preface Case Studies	xi xvii	
Chapter 1	What Is Statistics?		
• 1000	1.1 Statistics: What Is It?	2	
	1.2 The Elements of Statistics	5	
	1.3 Statistics: Witchcraft or Science?	6	
	1.4 Why Study Statistics?	7	
Chapter 2	Methods for Describing Sets of Data	11	
		12	
	<ul> <li>2.1 Types of Data</li> <li>2.2 Graphic Methods for Describing Quantitative Data:</li> </ul>		
	2.2 Graphic Methods for Describing Quantitative Data:  Stem and Leaf Displays	14	
	2.3 Graphic Methods for Describing Quantitative Data: Relative Frequency Histograms and Polygons	20	
		28	
*	* * * * * * * * * * * * * * * * * * * *	37	
	2.5 Numerical Measures of Variability 2.6 Interpreting the Standard Deviation	42	
	2.7 Measures of Relative Standing	50	
	2.8 Detecting Outliers	55	
	2.9 Outliers, Rare Events, and Statistical Inference	57	
	2.10 Distorting the Truth with Descriptive Techniques	62	
Chapter 3	Probability	77	
		78	
	3.1 Events, Sample Spaces, and Probability	90	
	3.2 Compound Events	92	
	3.3 Complementary Events	97	
	3.4 Conditional Probability 3.5 Probabilities of Unions and Intersections	104	
		115	
	3.6 Probability and Statistics: An Example	116	
	3.7 Random Sampling 3.8 Same Counting Rules (Optional)	118	
	3.8 Some Counting Rules (Optional)		

Chapter 4	Discrete Random Variables		
	4.1 Two Types of Random Variables	139	
	4.2 Probability Distributions for Discrete Random Variables	142	
	4.3 Expected Values of Discrete Random Variables	146	
	4.4 The Binomial Random Variable	153	
	4.5 The Poisson Random Variable (Optional)	167	
	4.6 The Hypergeometric Random Variable (Optional)	173	
	4.7 The Geometric Random Variable (Optional)	178	
Chapter 5	Continuous Random Variables	191	
	5.1 Continuous Probability Distributions	192	
	5.2 The Normal Distribution	193	
	5.3 Approximating a Binomial Distribution with a Normal Distribution		
	5.4 The Uniform Distribution (Optional)	214	
	5.5 The Exponential Distribution (Optional)	219	
Chapter 6	Sampling Distributions	235	
	6.1 What Is a Sampling Distribution?	237	
	<ul><li>6.1 What Is a Sampling Distribution?</li><li>6.2 Properties of Sampling Distributions: Unbiasedness</li></ul>	201	
	and Minimum Variance	244	
	6.3 The Central Limit Theorem	250	
	6.4 The Relation Between Sample Size and a Sampling Distribution		
	6.5 The Sampling Distribution for the Difference Between Two Statis		
Chapter 7	Estimation and Tests of Hypotheses: Single San	nple 269	
/	7.1 Large-Sample Estimation of a Population Mean	270	
	7.2 A Large-Sample Test of an Hypothesis About a Population Mea		
	7.3 Observed Significance Levels: p-Values	293	
	7.4 Small-Sample Inferences About a Population Mean	297	
	7.5 Large-Sample Inferences About a Binomial Population Proportion		
	7.6 Determining the Sample Size	317	
	7.7 Inferences About a Population Variance (Optional)	321	

Chapter 8	Estimation and Tests of Hypotheses: Two Samples		
	8.1 Large-Sample Inferences About the Difference Between		
	Two Population Means: Independent Sampling	336	
	8.2 Small-Sample Inferences About the Difference Between		
	Two Population Means: Independent Sampling	346	
	8.3 Inferences About the Difference Between Two Population Means:	356 370	
	Paired Difference Experiments		
	8.4 Inferences About the Difference Between Population Proportions:		
	Independent Binomial Experiments		
	8.5 Determining the Sample Size	379	
	8.6 Comparing Two Population Variances: Independent Random Samp	s 383	
Chapter 9	Analysis of Variance: Comparing More Than  Two Means		
	9.1 Comparing More Than Two Population Means: The Completely	409	
	Randomized Design	427	
	9.2 Randomized Block Design	421	
	9.3 The Analysis of Variance for a Two-Way Classification of Data:	443	
	Factorial Experiments	460	
	9.4 A Procedure for Making Multiple Comparisons	400	
Chapter 10	Nonparametric Statistics	483	
	10.1 Comparing Two Populations: Wilcoxon Rank Sum Test for		
	Independent Samples	485	
	10.2 Comparing Two Populations: Wilcoxon Signed Rank Test for		
	the Paired Difference Experiment	493	
	10.3 Kruskal-Wallis H-Test for a Completely Randomized Design	501	
	10.4 The Friedman F <sub>c</sub> -Test for a Randomized Block Design	510	
	10.5 Spearman's Rank Correlation Coefficient	517	
Chapter 11	The Chi Square Test and the Analysis of		
Chapter 11	Contingency Tables	543	
	11.1 One-Dimensional Count Data: The Multinomial Distribution	544	
	11.2 Contingency Tables	552	
	11.3 Contingency Tables with Fixed Marginal Totals	562	
	11.4 Caution	569	

Chapter 12	Simple Linear Regression		
	12.1	Probabilistic Models	582
	12.2	Fitting the Model: Least Squares Approach	585
	12.3		594
	12.4		595
	12.5 Assessing the Utility of the Model: Making Inferences	350	
		About the Slope β <sub>1</sub>	598 605 608
		12.6 Correlation: A Measure of the Utility of the Model	
	12.7	- Committee of Determination	
	12.8	o and a second s	615
	12.9	Simple Linear Regression: An Example	+- ( 622
Chapter 13	Mu	ltiple Regression	637
	13.1	Model Assumptions	639
	13.2	Fitting the Model: Least Squares Approach	640
	13.3	Estimation of $\sigma^2$ , the Variance of $\varepsilon$	643
	13.4	Estimating and Testing Hypotheses About the β-Parameters	644
	13.5	Checking the Utility of a Model: R2 and the	011
		Analysis of Variance F-Test	653
	13.6	Using the Model for Estimation and Prediction	663
	13.7	Multiple Regression: An Example	666
	13.8	Statistical Computer Programs	669
	13.9		673
Chapter 14		lel Building	691
	14.1	The Two Types of Independent Variables:	
	140	Quantitative and Qualitative	693
	14.2	Models with a Single Quantitative Independent Variable	695
	14.3	Models with Two or More Quantitative Independent Variables	703
	14.4	Model Building: Testing Portions of a Model	712
	14.5	Models with One Qualitative Independent Variable	723
	14.6	Comparing the Slopes of Two or More Lines	730
	14.7	Comparing Two or More Response Curves	743
	14.8	Model Building: Stepwise Regression	749

Index

Appendix	Tables		769
	Table I	Random Numbers	771
	Table II	Binomial Probabilities	774
4	Table III	Exponentials	778
	Table IV	Normal Curve Areas	780
	Table V	Critical Values of t	781
	Table VI	Critical Values of $\chi^2$	782
	Table VII	Percentage Points of the F-Distribution, $\alpha = .10$	784
	Table VIII	Percentage Points of the F-Distribution, $\alpha = .05$	786
	Table IX	Percentage Points of the F-Distribution, $\alpha = .025$	788
	Table X	Percentage Points of the F-Distribution, $\alpha = .01$	790
	Table XI	Critical Values of T <sub>L</sub> and T <sub>U</sub> for the Wilcoxon Rank Sum Test:	
		Independent Samples	792
	Table XII	Critical Values of To in the Wilcoxon Paired Difference Signed	
		Rank Test	793
	Table XIII	Critical Values of Spearman's Rank Correlation Coefficient	794
	Table XIV	Percentage Points of the Studentized Range, q(k, v), Upper 5%	795
	Table XV	Percentage Points of the Studentized Range, $q(k, \nu)$ , Upper 1%	796
	Engwa	rs to Selected Exercises	797
	MISWE	a to Describe Macrosaca	
	Index		819