Contents

Preface		Xiii
Ack	nowledgments	xvii
Note to Students		xxi
1.	How We Reason	1
	Key Concepts	xx
	Prologue	1
	Introduction	2
	Setting the Stage	2
	Science	5 7
	Example	7
	The Scientific Method	9
	Testing Hypotheses	11
	From Hypotheses to Theories	16
	Types of Relationships	18
	Association and Causation	22
	The Unit of Analysis	25
	Example	26
	Conclusion	29
	Exercises	30
2.	Levels of Measurement and Forms of Data	33
	Key Concepts	32
	Prologue	33
	Introduction	34
	Measurement	34
	Qualitative and Quantitative Data	35
	Nominal Level of Measurement	36
	Forms of Nominal-Level Data	38
	Ordinal Level of Measurement	40
	Forms of Ordinal-Level Data	40
	Likert Scales	43
	Scores Versus Frequencies	45

	Interval and Ratio Levels of Measurement	45
	Forms of Interval-Level Data	48
	Tables Containing Nominal Level of Measurement Variables	54
	Conclusion	55
	Exercises	56
3.	Defining Variables	63
	Key Concepts	62
	Prologue	63
	Introduction	64
	Gathering the Data	64
	Operational Definitions	65
	Index and Scale Construction	69
	Validity	73
	Reliability	75
	Conclusion	77
	Exercises	80
4.	Measuring Central Tendency	83
	Key Concepts	82
	Prologue	83
	Introduction	84
	Central Tendency	84
	The Mean	85
	The Median	90
	Grouped Data	94
	Using Central Tendency	98
	The Mode	98
	Interpreting Graphs	104
	Central Tendency and Levels of Measurement	105
	Skewness	106
	Other Graphic Representations	112
	Stem and Leaf Displays	112
	Boxplots	113
	Conclusion	116
	Summary of Major Formulas	117
	Exercises	117
5.	Measuring Dispersion	127
	Key Concepts	126
	Prologue	127
	Introduction	128
	Visualizing Dispersion	128

	The Range	129
	The Mean Deviation	130
	The Variance and Standard Deviation	132
	The Computational Formulas for Variance	
	and Standard Deviation	136
	Variance and Standard Deviation for	
	Data in Frequency Distributions	139
	Conclusion	141
	Summary of Major Formulas	141
	Exercises	142
6.	Constructing and Interpreting Contingency Tables	149
	Key Concepts	148
	Prologue	149
	Introduction	150
	Contingency Tables	150
	Regrouping Variables	151
	Generating Percentages	155
	Interpreting	159
	Example	160
	Controlling for a Third Variable	164
	Partial Tables	167
	Causal Models	172
	Computer Applications	175
	SPSS	175
	SAS	177
	Conclusion	180
	Exercises	181
7.	Statistical Inference and Tests of Significance	191
	Key Concepts	190
	Prologue	191
	Introduction	192
	What Is Statistical Inference?	192
	Random Samples	195
	Comparing Means	198
	Comparing a Sample Mean to a	
	Population Mean or Other Value	200
	Comparing a Sample Mean to	
	Another Sample Mean	202
	Comparing More Than Two Sample Means	202

	Probabilities	206
	Decision Making	206
	Review	208
	Examples	209
	Directional Versus Nondirectional Alternative	
	Hypotheses (One-Tailed Versus Two-Tailed Tests)	210
	Setting the Level of Significance	212
	Degrees of Freedom	214
	Conclusion	214
	Steps in Significance Testing	214
	Summary of Major Formulas	216
	Exercises	217
8.	Probability Distributions	
	and One-Sample z and t Tests	225
	Key Concepts	224
	Prologue	225
	Introduction	226
	Normal Distributions	226
	The One-Sample z Test for Statistical Significance	234
	The Central Limit Theorem	238
	Review	243
	The Normality Assumption	244
	The One-Sample t Test	246
	Degrees of Freedom	249
	The t Table	250
	An Alternative t Formula	252
	A z Test for Proportions	253
	Interval Estimation	254
	Confidence Intervals for Proportions	256
	More on Probability	258
	The Addition Rule	258
	The Multiplication Rule	260
	Permutations and Combinations	261
	Conclusion	262
	Summary of Major Formulas	263
	Exercises	264
9.	Two-Sample t Tests	271
	Key Concepts	270
	Prologue	271

	Introduction	272
	Independent Samples Versus Dependent Samples	272
	The Two-Sample t Test for	
	Independently Drawn Samples	275
	Adjustments for Sigma-Hat Squared (σ^2)	288
	Interpreting a Computer-Generated t Test	288
	Computer Applications: Independent Samples t Tests	290
	SPSS	290
	SAS	291
	Excel	294
	The Two-Sample t Test for Dependent Samples	297
	Computer Applications: Dependent Samples t Test	301
	SPSS	301
	SAS	301
	Excel	303
	Statistical Significance Versus Research Significance	303
	Statistical Power	306
	Conclusion	309
	Summary of Major Formulas	309
	Exercises	311
10.	One-Way Analysis of Variance	317
	Key Concepts	316
	Prologue	317
	Introduction	318
	How Analysis of Variance Is Used	318
	Analysis of Variance in Experimental Situations	319
	F: An Intuitive Approach	322
	ANOVA Terminology	326
	The ANOVA Procedure	330
	Comparing F With t	337
	Analysis of Variance With Experimental Data	338
	Post Hoc Testing	340
	Computer Applications	343
	SPSS	343
	SAS	345
	Excel	348
	Two-Way Analysis of Variance	348
	Conclusion	352
	Summary of Major Formulas	352
	Exercises	353

11.	Measuring Association in Contingency Tables	359
	Key Concepts	358
	Prologue	359
	Introduction	360
	Measures for Two-by-Two Tables	360
	Yule's Q	362
	The Phi Coefficient	365
	Measures for <i>n</i> -by- <i>n</i> Tables	367
	Goodman and Kruskal's Gamma (γ)	367
	Goodman and Kruskal's Lambda (λ)	371
	Lambda—Column Variable Dependent	372
	Lambda—Row Variable Dependent	375
	Curvilinearity	377
	Other Measures of Association	380
	Interpreting an Association Matrix	381
	Conclusion	385
	Summary of Major Formulas	385
	Exercises	386
12.	The Chi-Square Test	397
	Key Concepts	396
	Prologue	397
	Introduction	398
	The Context for the Chi-Square Test	398
	Expected Frequencies	400
	Observed Versus Expected Frequencies	405
	Using the Table of Critical Values of Chi-Square	. 408
	Calculating the Chi-Square Value	412
	Yates's Correction	415
	Validity of Chi-Square	417
	Directional Alternative Hypotheses	422
	Testing Significance of Association Measures	425
	Association Versus Significance	426
	Chi-Square and Phi	429
	Computer Applications	431
	SPSS	431
	SAS	433
	Conclusion	435
	The Limits of Statistical Significance	435
	Summary of Major Formulas	436
	Exercises	437

13.	Correlation and Regression Analysis	443
	Key Concepts	442
	Prologue	443
	Introduction	444
	The Setting	444
	Cartesian Coordinates	447
	The Concept of Linearity	451
	Linear Equations	455
	Linear Regression	460
	The Correlation Coefficient	468
	The Coefficient of Determination	472
	Finding the Regression Equation	474
	Computer Applications	479
	SPSS	479
	SAS	484
	Excel	485
	Correlation Measures for Analysis of Variance	486
	Conclusion	489
	Summary of Major Formulas	489
	Exercises	490
14.	Additional Aspects of	
	Correlation and Regression Analysis	497
	Key Concepts	496
	Prologue	497
	Introduction	498
	Statistical Significance for r and b	498
	Significance of r	506
	Partial Correlations and Causal Models	508
	The Role of the Partial Correlation Coefficient	511
	Multiple Correlation and the	
	Coefficient of Multiple Determination	516
	Multiple Regression	520
	An Example From Judicial Behavior	524
	The Standardized Partial Regression Slope	528
	Using a Regression Printout	530
	Stepwise Multiple Regression	533
	Computer Applications	538
	Partial Correlations—SPSS	538
	Partial Correlations—Other Programs	540
	Multiple Regression—SPSS	540

Multiple Regression—SAS	543
Multiple Regression—Excel	547
Stepwise Multiple Regression—SPSS	547
Stepwise Multiple Regression—SAS	552
Conclusion	552
Summary of Major Formulas	557
Exercises	558
Appendix 1: Proportions of Area	
Under Standard Normal Curve	561
Appendix 2: Distribution of t	565
Appendix 3: Critical Values of F for $p = .05$, .01, and .001	566
Appendix 4: Critical Values of Chi-Square	569
Appendix 5: Critical Values of the Correlation Coefficient	570
Answers to Selected Exercises	571
Glossary	587
Index	603
About the Author	610