

Contents

1 /	Bivariate Regression Analysis	1
1.1	<i>Linear Equations</i>	2
1.2	<i>Using Linear Equations in Prediction</i>	4
1.3	<i>The Standard Error of Estimate</i>	12
1.4	<i>The Second Regression Line</i>	14
1.5	<i>The Linear Regression Model</i>	15
1.6	<i>Inferences about Parameters in the Linear Regression Model</i>	18
1.7	<i>Linear Regression in Matrix Terms</i>	31
1.8	<i>Exercises</i>	33
2 /	Bivariate Linear Correlation	36
2.1	<i>The Correlation Coefficient</i>	36
2.2	<i>Alternative Formulas for the Correlation Coefficient</i>	38
2.3	<i>A Numerical Example</i>	40
2.4	<i>A Mathematical Model for Bivariate Linear Correlation</i>	43
2.5	<i>The Sampling Distribution of r</i>	46
2.6	<i>Interval Estimation in Correlation Analysis</i>	47
2.7	<i>Tests of Hypotheses in Correlation Analysis</i>	49
2.8	<i>The Design of Regression and Correlation Studies</i>	54
2.9	<i>Interpretation of Results of Correlational Studies</i>	57
2.10	<i>Factors That Affect the Sizes of Correlation Coefficients</i>	58
2.11	<i>Exercises</i>	61
3 /	Further Methods of Bivariate Correlation	63
3.1	<i>Rank Correlation Methods</i>	63
3.2	<i>Biserial Correlation</i>	73
3.3	<i>Point Biserial Correlation</i>	76
3.4	<i>Tetrachoric Correlation</i>	78
3.5	<i>Measures of Association</i>	82
3.6	<i>Intraclass Correlation</i>	87
3.7	<i>Exercises</i>	90

4 /	Multiple Regression and Correlation	93
4.1	<i>Mathematical Models in Multiple Regression Analysis</i>	93
4.2	<i>Estimates of Parameters in Multiple Regression</i>	98
4.3	<i>The Multiple Correlation Coefficient</i>	108
4.4	<i>Tests of Significance in Multiple Regression and Correlation</i>	110
4.5	<i>Partial Correlation</i>	115
4.6	<i>Selecting a Satisfactory Subset of Predictors</i>	117
4.7	<i>Assessing the Relative Contributions of Predictors</i>	119
4.8	<i>Applications</i>	121
4.9	<i>Multivariate Correction for Restriction in Range</i>	127
4.10	<i>The Use of Dummy Variables in Regression Analysis</i>	129
4.11	<i>Analysis of Variance as a Multiple Regression Problem</i>	131
4.12	<i>Exercises</i>	141
5 /	Canonical Correlation	146
5.1	<i>Rationale Underlying Canonical Correlation</i>	146
5.2	<i>The Mathematics of Canonical Correlation</i>	148
5.3	<i>Computation of Canonical Correlation Coefficients</i>	153
5.4	<i>Significance of Tests in Canonical Correlation</i>	155
5.5	<i>Determination of the Weights c and d</i>	156
5.6	<i>Interpreting Results of Canonical Correlation Analysis</i>	158
5.7	<i>Precautions When Using Canonical Correlation Analysis</i>	163
5.8	<i>Exercises</i>	164
6 /	Discriminant Analysis	170
6.1	<i>The Fisher Linear Discriminant Function</i>	171
6.2	<i>The General Case of G Groups</i>	183
6.3	<i>The Classification Problem: Assigning Individuals to Groups</i>	196
6.4	<i>Exercises</i>	215
7 /	Multivariate Analysis of Variance	220
7.1	<i>One-way Manova</i>	221
7.2	<i>Two-way Manova</i>	229
7.3	<i>Exercises</i>	242

8 / Factor Analysis 245

- 8.1 *Models in Exploratory Factor Analysis* 248
- 8.2 *The Spearman and Holzinger Models* 254
- 8.3 *Principal-Component Analysis* 262
- 8.4 *Transformed (Rotated) Solutions* 266
- 8.5 *Factor Scores* 281
- 8.6 *Exercises* 283

9 / Multivariate Analysis of Categorical Data 286

- 9.1 *The Multinomial Distributions: Definitions and Notations* 288
- 9.2 *Large-Sample Approximations for a Multinomial Distribution* 290
- 9.3 *Estimation of Multinomial Class Probabilities and Tests of Hypotheses* 294
- 9.4 *Asymptotic Distributions of Estimators of Linear Combinations of Multinomial Class Probabilities* 301
- 9.5 *Asymptotic Distributions of Estimators of Non-Linear Combinations of Multinomial Class Probabilities* 312
- 9.6 *Log-Linear Models* 327
- 9.7 *Computing* 363
- 9.8 *Exercises* 364

Appendices 375

- A *Matrix Algebra* 375
- B *Some Elementary Differential Calculus* 387
- C *Tables* 397
- D *Solution of a System of Linear Equations* 423
- E *Procedure for Multivariate Correction for Restriction in Range* 426

References 432

Index 439