CONTENTS

Preface *v*

Part I—BIVARIATE RELATIONSHIPS

Chapter 1 The Nature of Data *3*
Scales of Measurement *5*
Accuracy of Measurement *9*
Shape of Relationship *12*

Chapter 2 Summary Indices for Bivariate Relationships *17*
The Principle of Least Squares *21*
General Form of the Correlation Ratio *22*
Continuous, Interval X *28*
Linear Regression *32*
DEFINING THE LINE *33*
SOME CONVENTIONS *34*
THE REGRESSION EQUATION *36*
REGRESSION COEFFICIENTS WITH DEVIATION SCORES *42*
Product Moment Correlation *44*
DEFINITION *45*
SLOPE OF THE REGRESSION LINE *46*
PROPORTION OF VARIANCE *48*
ACCURACY OF PREDICTION *50*

PROPORTION OF COMMON ELEMENTS 51
EXPECTATION OF SUCCESS 54
NORMAL CORRELATION SURFACE 60
GEOMETRIC VECTOR INTERPRETATION 62

Chapter 3 Other Indices of Relationship for Two Variables 73
Special Product Moment Correlations 74
Estimates of Product Moment Correlations 82
Other Indices 89

Chapter 4 Terminology of Matrices and Geometry 95
Vector 95
Matrix 97
Matrix Terminology 99
Matrix Manipulations 101
Geometric Considerations 104

Part II—EXTERNAL FACTOR ANALYSIS

Chapter 5 Part and Partial Correlation 125
Part Correlation 125
Partial Correlation 130
Test of Significance 133
Higher Order Partials 134

Chapter 6 Multiple Correlation 139
Three Variable Case 139
Multiple Description 152
A Three Variable Example 156
More Than Two Predictors 158
An Example 167

Chapter 7 Canonical Analysis 175
General Description 175
An Example 193
Beyond Canonical Analysis 200

Chapter 8 Discriminant Analysis 203
The Case of Two Groups 205
Multiple Discriminant Analysis 212
Interpreting Discriminant Analysis 213
Mathematical Considerations 216
An Example 220

Part III—INTERNAL FACTOR ANALYSIS

Chapter 9 Cluster Analysis 227
Cluster Analysis of Variables 228
An Example 232
Alternative Strategies in Cluster Analysis 236

Chapter 10 The General Model for Factor Analysis 241
The Factor Analysis Problem 242
The General Factor Analysis Model 247
The Mathematical Model 254
An Example 257

Chapter 11 Modification of the Factor Analysis Model 269
Criteria for Factor Solutions 270
The Number of Factors Problem 272
The Communality Problem 282
The Rotation Problem 287
Communality and Number of Factors Problems Revisited 306
Different Initial Solutions 308

Chapter 12 Other Issues in Factor Analysis 317
Cross-validation in Factor Analysis 318
Factor Scores 319
Application of Factor Analysis 322
Interpretation of Factors 327

References 331

Index 338