

CONTENTS

Preface	iii
List of Figures	vii
List of Tables	ix
Chapter 1 MATRICES	1
1.1 Introduction	1
1.2 Definitions and Properties	1
1.3 Matrix Operations	3
1.4 Linear Equations	7
1.5 A Procedure for Matrix Inversion	9
1.6 Operations with Partitioned Matrices	13
1.7 Quadratic Forms	18
1.8 Problems	19
Chapter 2 LINEAR MODELS: ESTIMATION	20
2.1 Definitions and Uses of Linear Models	20
2.2 Basic Definitions	21
2.3 Assumptions and Limitations	24
2.4 Estimation of Parameters by Least Squares	27
2.5 The Partial Regression Coefficient	35
2.6 An Example	39
2.7 Standardized Regression Coefficients	43
2.8 Regression Through an Arbitrary Point	44
2.9 Curvilinear Regressions	45
2.10 Problems	47
Chapter 3 LINEAR MODELS: INFERENCE	55
3.1 Introduction	55
3.2 Simple Linear Regression	57
3.3 The Correlation Coefficient	63
3.4 Multiple Regression	64
3.5 Test for the Entire Model	64
3.6 Multiple Correlation	68
3.7 Test for Subset of the Model	71
3.8 A Subset of Size One: A Special Case	77
3.9 Partial Correlation	80
3.10 Confidence Intervals	82
3.11 Problems	86

Chapter 4	THE "RANDOM" ERROR	91
	4.1 <i>Specification Error</i>	92
	4.2 <i>An Example of Specification Error</i>	94
	4.3 <i>Autocorrelation</i>	99
	4.4 <i>Heteroskedasticity</i>	103
	4.5 <i>Problems</i>	104
Chapter 5	TOO MANY VARIABLES	112
	5.1 <i>Introduction</i>	112
	5.2 <i>Multicollinearity</i>	116
	5.3 <i>Variable Selection</i>	120
	5.4 <i>Other Procedures</i>	137
	5.5 <i>An Example of Ridge Regression</i>	138
	5.6 <i>Significance Tests</i>	149
	5.7 <i>Problems</i>	150
Chapter 6	MODELS NOT STRICTLY LINEAR	159
	6.1 <i>Introduction</i>	159
	6.2 <i>Polynomial Regression</i>	160
	6.3 <i>Orthogonal Polynomials</i>	162
	6.4 <i>Multidimensional Polynomials and Response Surfaces</i>	172
	6.5 <i>Analysis of Response Surface Experiments</i>	177
	6.6 <i>Nonlinear Regression</i>	183
	6.7 <i>Problems</i>	188
Chapter 7	GENERAL LINEAR MODELS	194
	7.1 <i>Introduction</i>	194
	7.2 <i>Example: Two-Factor Balanced Experiment</i>	196
	7.3 <i>Two-Factor Unbalanced Experiment</i>	205
	7.4 <i>Variances of Treatment Differences and Combinations</i>	215
	7.5 <i>Unbalanced Data, Multifactor Experiments</i>	217
	7.6 <i>Problems</i>	220
Chapter 8	REGRESSION WITH GROUPED DATA; COVARIANCE	224
	8.1 <i>Introduction</i>	224
	8.2 <i>Models Involving Individual Observations</i>	226
	8.3 <i>Model Involving Group Means</i>	234
	8.4 <i>Analysis of Covariance</i>	237
	8.5 <i>The General Linear Model</i>	238
	8.6 <i>A Note on Computations</i>	242
	8.7 <i>Problems</i>	243
Appendix		248
Bibliography		256
Index		259