

CONTENTS

PREFACE	9
LIST OF SYMBOLS	13
1 MULTIVARIATE UNIVERSAL LINEAR STATISTICAL MODELS WITHOUT CONSTRAINTS	15
1 BLUEs of the unbiasedly estimable functions of the matrix \mathbf{B}	15
2 Estimation of the parameter σ^2 and the variance components $\vartheta_1, \dots, \vartheta_p$	23
3 Estimation of the matrix Σ	26
4 Confidence regions (normality is assumed)	27
4.1 The matrix Σ is given	27
4.2 The matrix Σ is of the form $\sigma^2 \mathbf{V}$	30
4.3 The matrix Σ is of the form $\sum_{i=1}^p \vartheta_i \mathbf{V}_i$	31
4.4 The matrix Σ is completely unknown	42
5 Testing statistical hypotheses (under normality)	50
5.1 The matrix Σ is given	50
5.2 The matrix Σ is of the form $\sigma^2 \mathbf{V}$	51
5.3 The matrix Σ is of the form $\sum_{i=1}^p \vartheta_i \mathbf{V}_i$	53
5.4 The matrix Σ is completely unknown	67
2 MULTIVARIATE UNIVERSAL LINEAR STATISTICAL MODELS WITH THE TYPE I CONSTRAINTS	71
1 Estimation of functions of the matrix \mathbf{B}	71
2 Estimation of the parameter σ^2 and the variance components $\vartheta_1, \dots, \vartheta_p$	87
3 Estimation of the matrix Σ	97
4 Confidence regions (normality is assumed)	98
4.1 The matrix Σ is given	98
4.2 The matrix Σ is of the form $\sigma^2 \mathbf{V}$	103
4.3 The matrix Σ is of the form $\sum_{i=1}^p \vartheta_i \mathbf{V}_i$	103
4.4 The matrix Σ is completely unknown	112
5 Testing linear hypotheses (under normality)	124
5.1 The matrix Σ is given	125
5.2 The matrix Σ is of the form $\sigma^2 \mathbf{V}$	127
5.3 The matrix Σ is of the form $\sum_{i=1}^p \vartheta_i \mathbf{V}_i$	127
5.4 The matrix Σ is completely unknown	135
3 MULTIVARIATE UNIVERSAL LINEAR STATISTICAL MODELS WITH THE TYPE II CONSTRAINTS	145
1 Estimation of functions of the matrices \mathbf{B}_1 and \mathbf{B}_2	145
2 Estimation of the parameter σ^2 and the variance components $\vartheta_1, \dots, \vartheta_p$	168
3 Estimation of the matrix Σ	176
4 Confidence regions (normality is assumed)	177
4.1 The matrix Σ is given	177
4.2 The matrix Σ is of the form $\sigma^2 \mathbf{V}$	188

4.3	The matrix Σ is of the form $\sum_{i=1}^p \vartheta_i \mathbf{V}_i$	188
4.4	The matrix Σ is completely unknown	199
5	Testing linear hypotheses (normality is assumed)	224
APPENDIX		237
A.1	Definitions and statements from algebra	237
A.2	Statements from probability theory and mathematical statistics	239
BIBLIOGRAPHY		245
INDEX		247