

CONTENTS

Preface	<i>page</i>	xi
Chapter 1	Introduction	1
	1.1 Objectives of statistical analysis and theory	1
	1.2 Criteria for the choice of families of models	5
	1.3 The analysis of complex responses	7
	1.4 Plan of the book	8
	Bibliographic notes	10
Chapter 2	Some general concepts	11
	2.1 The likelihood	11
	2.2 Sufficient statistics	18
	2.3 Some general principles of statistical inference	36
	2.4 Some approaches to statistical inference	45
	Bibliographic notes	56
	Further results and exercises	58
Chapter 3	Pure significance tests	64
	3.1 Null hypotheses	64
	3.2 Test statistics and their null distributions	66
	3.3 Composite null hypotheses	73
	3.4 Discussion	76
	Bibliographic notes	82
	Further results and exercises	83
Chapter 4	Significance tests: simple null hypotheses	88
	4.1 General	88
	4.2 Formulation	90
	4.3 Simple null hypothesis and simple alternative hypothesis	91
	4.4 Some examples	93
	4.5 Discrete problems	99
	4.6 Composite alternatives	101
	4.7 Two-sided tests	105

CONTENTS

4.8 Local power	<i>page</i> 106
4.9 Multidimensional alternatives	121
Bibliographic notes	125
Further results and exercises	126
Chapter 5 Significance tests: composite null hypotheses	131
5.1 General	131
5.2 Similar regions	134
5.3 Invariant tests	157
5.4 Some more difficult problems	171
Bibliographic notes	174
Further results and exercises	175
Chapter 6 Distribution-free and randomization tests	179
6.1 General	179
6.2 Permutation tests	182
6.3 Rank tests	187
6.4 Randomization tests	196
6.5 Distance tests	198
Bibliographic notes	202
Further results and exercises	203
Chapter 7 Interval estimation	207
7.1 Introduction	207
7.2 Scalar parameter	208
7.3 Scalar parameter with nuisance parameters	228
7.4 Vector parameter	236
7.5 Estimation of future observations	242
Bibliographic notes	246
Further results and exercises	247
Chapter 8 Point estimation	250
8.1 General	250
8.2 General considerations on bias and variance	252
8.3 Cramér-Rao inequality	254
8.4 Achievement of minimum variance and removal of bias	258
8.5 Estimates of minimum mean squared error	266
8.6 Robust estimation	270
Bibliographic notes	272

Further results and exercises	<i>page</i> 273
Chapter 9	Asymptotic theory 279
9.1	Introduction 279
9.2	Maximum likelihood estimates 283
9.3	Large-sample parametric significance tests 311
9.4	Robust inference for location parameters 344
Bibliographic notes	354
Further results and exercises	356
Chapter 10	Bayesian methods 364
10.1	Introduction 364
10.2	Bayes's theorem 365
10.3	Conjugate prior distributions 369
10.4	Interpretation of Bayesian probability statements 375
10.5	Bayesian versions of some previous types of procedure 390
10.6	Asymptotic Bayesian theory 399
10.7	Empirical Bayes procedures 400
Bibliographic notes	406
Further results and exercises	406
Chapter 11	Decision theory 412
11.1	Examples of statistical decision problems 412
11.2	Formulation of terminal decision problems 415
11.3	Solution of the fully specified terminal decision problem 417
11.4	Utility
11.5	Incompletely specified decision problems 426
11.6	Decision theory without prior distributions 429
11.7	Decision theory representation of common problems 441
11.8	A remarkable case of inadmissibility 445
11.9	Sequential decision problems 451
Bibliographic notes	458
Further results and exercises	459
Appendix 1	Determination of probability distributions 462
Appendix 2	Order statistics 466

CONTENTS

A2.1	General properties	<i>page</i> 466
A2.2	Special distributions	467
A2.3	Asymptotic distributions	468
A2.4	Linear combinations of order statistics	470
A2.5	Extreme value theory	472
Bibliographic notes		474
Appendix 3	Second-order regression for arbitrary random variables	475
References		478
Author Index		496
Subject Index		499