Essentials of Statistical Inference is a modern and accessible treatment of the procedures used to draw formal inferences from data. Aimed at advanced undergraduate and graduate students in mathematics and related disciplines, as well as those in other fields seeking a concise treatment of the key ideas of statistical inference, it presents the concepts and results underlying the Bayesian, frequentist, and Fisherian approaches, with particular emphasis on the contrasts between them. Contemporary computational ideas, as well as basic mathematical theory, are explained.

Written in a lucid and informal style, this concise text provides basic material on the main approaches to inference, as well as more advanced material on modern developments in statistical theory, including: contemporary material on Bayesian computation, such as MCMC; higher-order likelihood theory; predictive inference; bootstrap methods and conditional inference. It contains numerous extended examples of the application of formal inference techniques to real data, as well as historical commentary on the development of the subject. Throughout, the text concentrates on concepts, rather than on mathematical detail, while maintaining appropriate levels of formality. Each chapter ends with a set of accessible problems.

Based to a large extent on lectures given at the University of Cambridge over a number of years, the material has been polished by student feedback. Some prior knowledge of probability is assumed, while some previous knowledge of the objectives and main approaches to statistical inference would be helpful but is not essential.

Cambridge Series in Statistical and Probabilistic Mathematics

Editorial Board:

R. Gill (Department of Mathematics, Utrecht University)

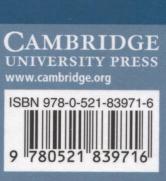
B. D. Ripley (Department of Statistics, University of Oxford)

S. Ross (Department of Industrial Engineering, University of California, Berkeley)

B. W. Silverman (St Peter's College, Oxford)

M. Stein (Department of Statistics, University of Chicago)

This series of high quality upper-division textbooks and expository monographs covers all aspects of stochastic applicable mathematics. The topics range from pure and applied statistics to probability theory, operations research, optimization and mathematical programming. The books contain clear presentations of new developments in the field and also of the state of the art in classical methods. While emphasizing rigorous treatment of theoretical methods, the books also contain applications and discussions of new techniques made possible by advances in computational practice.



	Prefa	ace sometiment famoutibnes been given bobbs	pag	ge ix
		Two-sided bypotheses and two-sided tests	1 0	
1	Intro	oduction / new wall-law / has write those, according law of the notification		1
2	D .	Confidence sets		
2		sion theory		4
	2.1	Formulation		4
	2.2	The risk function		5
	2.3	Criteria for a good decision rule		7
	2.4	Randomised decision rules		11
	2.5	Finite decision problems		11
	2.6	Finding minimax rules in general		18
	2.7	Admissibility of Bayes rules		19
	2.8	Problems and drag transmitted that the best of the bes		19
3	Baye	esian methods		22
	3.1	Fundamental elements		22
	3.2	The general form of Bayes rules		28
	3.3	Back to minimax		32
	3.4	Shrinkage and the James–Stein estimator		33
	3.5	Empirical Bayes		38
	3.6	Choice of prior distributions		39
	3.7	Computational techniques		42
	3.8	Hierarchical modelling		48
	3.9	Predictive distributions		52
	3.10	Data example: Coal-mining disasters		55
	3.11	Data example: Gene expression data		57
	3.12	Problems Leading to the second		60
pai	TT	Bavesian asymptotics		
4	-	othesis testing		65
	4.1	Formulation of the hypothesis testing problem		65
	4.2	The Neyman–Pearson Theorem		68
	4.3	Uniformly most powerful tests		69
	4.4	Bayes factors		73
	4.5	Problems Isomifold symplemy on board about the		78

5	Special models		
	5.1	Exponential families	81 81
	5.2	Transformation families	86
	5.3	Problems	88
6	Sufficiency and completeness		
	6.1	Definitions and elementary properties	90 90
	6.2	Completeness	94
	6.3	The Lehmann–Scheffé Theorem	95
	6.4	Estimation with convex loss functions	95
	6.5	Problems	96
7	Two	-sided tests and conditional inference	98
	7.1	Two-sided hypotheses and two-sided tests	99
	7.2	Conditional inference, ancillarity and similar tests	105
	7.3	Confidence sets	114
	7.4	Problems	117
8	Like	lihood theory	120
	8.1	Definitions and basic properties	120
	8.2	The Cramér–Rao Lower Bound	125
	8.3	Convergence of sequences of random variables	127
	8.4	Asymptotic properties of maximum likelihood estimators	128
	8.5	Likelihood ratio tests and Wilks' Theorem	132
	8.6	More on multiparameter problems	134
	8.7	Problems	137
9	High	er-order theory	140
	9.1	Preliminaries Preliminaries	141
	9.2	Parameter orthogonality	143
	9.3	Pseudo-likelihoods	145
	9.4	Parametrisation invariance	146
	9.5	Edgeworth expansion	148
	9.6	Saddlepoint expansion	149
	9.7	Laplace approximation of integrals	152
	9.8	The p^* formula	153
	9.9	Conditional inference in exponential families	159
	9.10	Bartlett correction	160
	9.11	Modified profile likelihood	161
	9.12	Bayesian asymptotics	163
	9.13	Problems	164
10	Predi	ictive inference	169
	10.1	Exact methods	169
	10.2	Decision theory approaches	172
	10.3	Methods based on predictive likelihood	175
	10.4	Asymptotic methods	179

		Contents	vii
	10.5	Bootstrap methods	183
	10.6	Conclusions and recommendations	185
	10.7	Problems	186
11	Bootstrap methods		190
	11.1	An inference problem	191
	11.2	The prepivoting perspective	194
	11.3	Data example: Bioequivalence	201
	11.4	Further numerical illustrations	203
	11.5	Conditional inference and the bootstrap	208
	11.6	Problems	214
	Biblio	ography	218
	Index	223	