

Topics for the Graduate Exam in Math 541B (Statistics B)

Hypothesis testing: Neyman-Pearson lemma, unbiasedness and invariance of tests, power, monotone likelihood ratio, uniformly most powerful tests, generalized likelihood ratio procedures, Wilks' theorem, goodness of fit tests.

Confidence intervals: Confidence interval methods including pivoting and duality with hypothesis testing, Bayesian credible regions.

Computationally intensive methods: The jackknife estimates of bias and variance, the bootstrap estimates of bias and variance, the bootstrap in regression, bootstrap confidence intervals, the EM algorithm and its asymptotic theory and convergence.

Monte Carlo methods: Random variable generation including rejection and importance sampling, the theory of Markov chains including their stationarity and reversibility, the Metropolis Hastings algorithm, the Gibbs sampler.

References:

- G. Casella and R.L. Berger, Statistical Inference
- T.S. Ferguson, A Course in Large Sample Theory
- G.J. McLachlan and T. Krishnan, The EM Algorithm and Extensions
- B. Efron, The Jackknife, the Bootstrap and Other Resampling Plans
- O. Haggstrom, Finite Markov Chains and Algorithmic Applications