Homework based on Chapter 20, 21
Computational Probability and Statistics
CIS 2033, Section 002

Due: 9:00 AM, Friday, April 24, 2015

20.1 (5 points) Given a random sample $X_1, X_2, \ldots, X_n$ from a distribution with finite variance σ^2. We estimate the expectation of the distribution with the sample mean $\overline{X}_n$. Argue that the larger our sample, the more efficient our estimator. What is the relative efficiency $Var(\overline{X}_n)/Var(\overline{X}_{2n})$ of $\overline{X}_{2n}$ with respect to $\overline{X}_n$?

20.7 (5 points) In Exercise 19.7 you showed that both T_1 and T_2 are unbiased estimators for θ. Which estimator would you prefer ? Motivate your answer.

21.9 (5 points) Tossing a coin is a Bernoulli trial, the random variable X denoting the results of a toss follows a Bernoulli distribution $\sim Ber(p)$, where p is the probability of getting a head.

a). Suppose you observed 10 tosses of a coin which are H,T,T,T,T,H,H,T,T,T. Determine the maximum likelihood estimates for p.

b).Extra credits (5 points) Suppose you observed n tosses of the coin which are x_1, x_2, x_n, where x_i is either H or T, can you write a general formula for the maximum likelihood estimator of p.

21.10 (5 points) Let $x_1, x_2, \ldots, x_n$ be a dataset that are observations of a random variable from a $Par(\alpha)$ distribution. What is the maximum likelihood estimate for α.