STA 110B Spring 1998

Quiz 7
Week of March 9, 1998

1) Which of the following estimators are unbiased for the indicated parameters?

☐ *i)* sample variance, s^2, for σ^2

☐ *ii)* sample proportion, P, for π

☐ *iii)* sample mean, $\bar{X}$, for μ

☐ *iv)* mean squared deviation, MSD, for σ^2

2) Suppose two Stat 110B students, each interested in estimating the fraction, π, of Duke students who believe Duke will win the upcoming NCAA tournament, each ask a random sample of 50 students if they think the Blue Devils will win. Denote by P_1 the proportion of individuals polled by student 1 that predict Duke will win, likewise denote by P_2 the proportion of individuals polled by student 2 that predict Duke will win.

a) Are P_1 and P_2 unbiased estimators of π? Why/why not?

b) What is the mean squared error (MSE) of P_1 (or P_2) for estimating π (written as a function of π)?

c) Suppose the students combine their results and estimate π using the average of their respective estimates, $P = 0.5P_1 + 0.5P_2$. What is the mean squared error (MSE) of P for estimating π (again, written as a function of π)? Assume, a bit unrealistically, that the samples are independent

d) Which estimator, P_1 or P, is more efficient for estimating π? Why?