STAT 135 CONCEPTS OF STATISTICS
QUIZ 1, LAB 102

July 1, 2021

Instructions: *You have 35 minutes to complete the quiz and upload it on bCourses. This quiz is open book and you may use a calculator, but all work must be shown in order to receive full credit.*

Problem 1 (2 points)**.** Consider a population consisting of 5 values: 2, 7, 4, 3, 10 and suppose we draw a sample (X_1, X_2) of size 2 from this population (Each value can be drawn with equal probability each time). Consider the proportion of sample values that are even. For example, if one sample has values $(X_1, X_2) = (4, 3)$, then the sample proportion $\hat{p}$ should be $1/2$ because 1 out of 2 observations is even.

Find the sampling distribution of this statistic. Is it an unbiased estimator of p which is defined as the proportion of the population values that are even?

Problem 2 (1 points)**.** Suppose that $X_1, \ldots, X_n$ are i.i.d discrete random observations from a population with a probability mass function given by

$$P(x = k|\lambda) = \frac{e^{-\lambda}\lambda^k}{k!}, \quad k = 0, 1, 2, \ldots$$

Here $\lambda > 0$ is an unknown population parameter. What is Method of Moments (MM) estimate of the parameter λ?

Problem 3 (2 points)**.** Consider the setup of the previous problem for $n = 115$. Suppose we compute $\hat{\lambda}_{MM} = 0.56$. Compute the bootstrap 99% confidence interval for λ and compare with the corresponding interval which uses a conservative estimate for the standard error, assuming we know that the true parameter $\lambda \in [0, 1]$.