

Problem set is due in class on Sep. 23rd. You must show your work to receive credit.

1. How large a random sample must be taken from a given distribution in order for the probability to be at least 0.99 that the sample mean will be within 2 standard deviations of the mean of the distribution?
2. Suppose that 16 digits are chosen at random with replacement from the set $\{0, \dots, 9\}$. What is the probability that their average will be between 4 and 6?
3. Using R, simulate draws from a Uniform distribution and calculate the maximum. Produce a histogram of the empirical distribution of the maximum. Is the central limit theorem at work? Does it depend on the sample size? Include code and relevant output with your solution set.
4. Suppose that X_1, \dots, X_n is a random sample from $U(-\theta, \theta)$, where $\theta > 0$. Can you find the method of moments estimator for θ ?
5. Suppose that X_1, \dots, X_n is a random sample from the following distribution

$$f(x; \theta) = \frac{1}{\theta^2} e^{-x/\theta^2}, x > 0$$

where $\theta \neq 0$ is a parameter. Can you find the method of moments estimator for θ ?