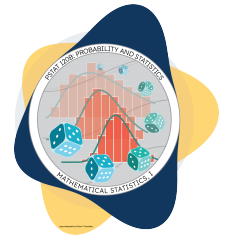


DISCUSSION WORKSHEET 04

PSTAT 120B: Mathematical Statistics, I
Summer Session A, 2024 with Instructor: Ethan P. Marzban



Conceptual Review

- (a) What are the main goals of **inferential statistics**?
- (b) What is a **population**? What is a **sample**? What is the difference between a sample and an **observed instance** (aka **realization**) of a sample?
- (c) What is a **statistic**? When does a statistic become an **estimator**?
- (d) What is the notion of a **sampling distribution**? How does that tie into the notions of **bias** and **unbiasedness**?
- (e) What is the **mean square error** of an estimator?

Problem 1: Exercise 8.12 from the Textbook

The reading on a voltage meter connected to a test circuit is uniformly distributed over the interval $(\theta, \theta + 1)$, where θ is the true but unknown voltage of the circuit. Suppose that Y_1, Y_2, \dots, Y_n denote a random sample of such readings.

- (a) Show that \bar{Y}_n is a biased estimator of θ and compute the bias.
- (b) Find a function of \bar{Y}_n that is an unbiased estimator of θ .
- (c) Find $\text{MSE}(\bar{Y}_n, \theta)$.