Homework 3
MATH 166 - Fall 2024
Tufts University, Department of Mathematics
Instructor: James M. Murphy
Due: September 26, 2024

1. Book Questions

Wasserman: Chapter 6: #2; Chapter 7: #1, 4, 9

2. Supplemental Question (Bias-Variance Tradeoff for Mean Estimation)

Let $x_1, x_2, \ldots, x_n$ be i.i.d. samples from a random variable X with expected value $\mu = \mathbb{E}(X)$ and variance $\sigma^2 = \text{Var}(X)$. For each of the following three estimators for μ, compute the bias, variance, and MSE. Discuss the benefits and problems associated with each. Which one would you prefer to use?

(a) $\hat{\theta}_n = \dfrac{1}{n}\displaystyle\sum_{i=1}^{n} x_i$.

(b) $\hat{\theta}_n = x_1$.

(c) $\hat{\theta}_n = 0$.