MTH 372 (2025) : Tutorial IV

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1. Let $X_1, \ldots, X_n$ be a random sample from a distribution from Normal $(0, \theta)$, $\theta > 0$. Find the MSE for $1/n \sum {X_i}^2$.

2. Let $X_1, \ldots, X_n$ form a random sample from a uniform distribution on the interval $(-\theta, \theta)$. What is the unbiased estimator of θ.

3. Let $X_1, \ldots, X_n$ be a random sample from Poisson (λ), $\lambda > 0$. Answer the following questions

   (a) Verify $\overline{X}$ and $S^2 = \dfrac{1}{n-1} \sum (X_i - \overline{X})^2$ are two unbiased estimators of λ.

   (b) Which one of the above estimators is better and why.

4. Let $X_1, \ldots, X_n$ be a random sample from Bernoulli distribution with parameter p. Find the uniformly minimum variance unbiased estimator (UMVUE) of p.