

STA 4322

Spring 2020

Quiz 4

Full Name: _____

On my honor, I have neither given nor received unauthorized aid on this quiz

Signature: _____

This is a 10 minute quiz. There are 5 multiple choice problems, each having EXACTLY ONE correct answer. You may *not* use any books, other references, or text-capable electronic devices.

1. A sufficient condition for an estimator $\hat{\theta}$ to be consistent for an unknown parameter θ based on a sample of size n is that

(a) $MSE(\hat{\theta}) \rightarrow 0$ as $n \rightarrow \infty$.

(b) $Var(\hat{\theta}) \rightarrow 0$ as $n \rightarrow \infty$.

(c) $Bias(\hat{\theta}) \rightarrow 0$ as $n \rightarrow \infty$.

(d) $E[\hat{\theta}] \rightarrow 0$ as $n \rightarrow \infty$.

SEE LECTURE NOTES

2. Suppose Y_1, Y_2, \dots, Y_n is a random sample from a population with unknown mean μ and unknown variance σ^2 . Which of these estimators is *biased* and *consistent* for μ ?

(a) Y_1 .

(b) \bar{Y} .

(c) $\bar{Y} + \frac{1}{n}$.

(d) $\frac{Y_1 + Y_2}{2}$.

$E(\bar{Y} + \frac{1}{n}) = \mu + \frac{1}{n}$ (BIASED)

$MSE(\bar{Y} + \frac{1}{n}) = V(\bar{Y} + \frac{1}{n}) + (E(\bar{Y} + \frac{1}{n}) - \mu)^2$ (CONSISTENT)
 $= \frac{\sigma^2}{n} + \frac{1}{n^2} \rightarrow 0$ as $n \rightarrow \infty$

3. Suppose Y_1, Y_2, \dots, Y_n is a random sample from a normal population with unknown mean μ and unknown variance σ^2 . Which of these estimators is *unbiased* and *consistent* for σ^2 ?

(a) Y_1 .

(b) \bar{Y} .

(c) S^2 .

(d) $\frac{1}{n} \sum_{i=1}^n (Y_i - \bar{Y})^2$.

SEE LECTURE NOTES

4. Let $\hat{\theta}$ be a consistent estimator of θ , and $\hat{\mu}$ be a consistent estimator for μ . Then $\hat{\theta} + \hat{\mu}$ is a consistent estimator for

(a) θ .

(b) μ .

(c) $\theta - \mu$.

(d) $\theta + \mu$.

SEE LECTURE NOTES

5. An estimator $\hat{\theta}$ (based on a sample of size n) is defined to be consistent for θ if for every $\epsilon > 0$, $P(|\hat{\theta} - \theta| \leq \epsilon) \rightarrow 1$ as $n \rightarrow \infty$. This statement is

(a) True.

(b) False.

SEE LECTURE NOTES