CA7 - Parameter Estimation and Properties of Estimators

Add Instructions...

1 Multiple Choice 5 points

For an estimator θ_{est} of an unknown parameter θ to be unbiased, what must be true about the relationship between the expected value $E\left[\theta_{est}\right]$ and the value of the parameter being estimated θ?

- (selected) They must be equal to each other.
- $E\left[\theta_{est}\right]$ is greater than the parameter being estimated θ.
- $E\left[\theta_{est}\right]$ is less than the parameter being estimated θ.
- They must be at least two standard deviations apart from each other.

2 Multiple Choice 3 points

Criteria to check a parameter estimator to be good are

- ○ Unbiassedness
- ○ Sufficiency
- ○ Consistency
- ● All of the options above

3 Multiple Choice 2 points

Consider a population that is distributed as $Uniform\left[0, \theta\right]$, where $\theta > 0$. Then, if $x_1, x_2, \ldots, x_n$ are i.i.d. samples, then which of the following statistics are sufficient?

- A. $\frac{x_1+x_2+\ldots+x_n}{n}$
- B. $x_1 \times x_2 \times \ldots \times x_n$
- C. $\max\left\{x_1, x_2, \ldots, x_n\right\}$
- D. $\min\left\{x_1, x_2, \ldots, x_n\right\}$

- ○ A and B
- ○ D only
- ● C only
- ○ B and D

4 Multiple Choice 5 points

Assume a random variable X follows $Binomial\left(2,p\right)$ distribution. The value of X is observed as $x_1=1, x_2=2, x_3=0, x_4=2$. Which of the following is the maximum likelihood estimate of p

- ( ) 0.5
- ( ) 1
- (•) 0.625
- ( ) 2

5 Multiple Choice 5 points

Let $X_1, X_2, ..., X_n$ be a random sample of size n from a population distributed as $Geometric\left(p\right)$, i.e., with the random variable defined by the distribution function:
$f_X\left(x|p\right)=p\left(1-p\right)^{x-1}$, find the method of moment estimate for p

- ( ) $\frac{X_1+X_2+...+X_n}{n}$
- (•) $\frac{n}{X_1+X_2+...+X_n}$
- ( ) $\frac{1}{X_1+X_2+...+X_n}$
- ( ) $\frac{n}{n+X_1+X_2+...+X_n}$