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Method of Moments - Quiz

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Question 1

1.0/1.0 point (graded)

In this lecture segment, we hear 3 ways to derive estimators: 1) the method of moments, 2) maximum likelihood estimation, and 3) dreaming them up. Which of the following estimators for θ from a $U[0, \theta]$ distribution is derived using the method of moments?

- a. Random sample
- b. 2 times the sample mean ✔
- c. N^{th} order statistic
- d. $(N-1)^{th}$ order statistic

Explanation

As shown in the lecture segment, estimating θ using the sample mean is a method derived using the method of moments. We equate the first population moment with the first sample moment and solve for the parameter. On the other hand, the n^{th} order statistic is an estimator derived using maximum

likelihood estimation.

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Question 2

1.0/1.0 point (graded)

What is the first population moment of a $U[0, \theta]$ distribution?

- a. θ
- b. $\frac{\theta}{2}$ ✔
- c. $\frac{1}{n}\sum_{i=1}^{n} X_i$
- d. $\frac{2}{n}\sum_{i=1}^{n} X_i$

Explanation

The first population moment is $E[X]$, which is $\frac{\theta}{2}$ for a $U[0, \theta]$ distribution. (c) is the sample mean, which is the first sample moment.

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Question 3

1.0/1.0 point (graded)

Which of the following is the second sample moment?

a. $\frac{2}{n}\sum_{i=1}^{n} X_i$

b. $\frac{1}{n^2}\sum_{i=1}^{n} X_i$

c. $\frac{1}{n}\sum_{i=1}^{n} X_i^2$ ✔

d. $\frac{1}{2}(\sum_{i=1}^{n} X_i)^2$

Explanation

The sample moments are defined by $\frac{1}{n}\sum_{i=1}^{n} X_i$, $\frac{1}{n}\sum_{i=1}^{n} X_i^2$, $\frac{1}{n}\sum_{i=1}^{n} X_i^3$, $\ldots$ The population moments, on the other hand, are defined by expectations and can be expressed as functions of the parameters $E[X], E[X^2], E[X^3], \ldots$.

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Question 4

1.0/1.0 point (graded)

True or False: The method of moments can be used if we wish to estimate more than one parameter.

- a. True ✔
- b. False

Explanation

Yes, we can use the method of moments even if we have more than one parameter to estimate. We just use as many sample and population moments as necessary. If we have k parameters to estimate, then we equate the 1^{st} through k^{th} population moments with the 1^{st} through k^{th} sample moments. Then we have k equations and k unknown parameters to solve for.

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Discussion

Topic: Module 7 / Method of Moments - Quiz

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