

MITx: 14.310x Data Analysis for Social Scientists

Heli



#### Bookmarks

- Module 1: The Basics of R and Introduction to the Course
- ► Entrance Survey
- Module 2: Fundamentals of Probability, Random Variables, Distributions, and Joint Distributions
- Module 3: Gathering and Collecting Data,
   Ethics, and Kernel
   Density Estimates
- Module 4: Joint,
   Marginal, and
   Conditional
   Distributions &
   Functions of Random
   Variable

Module 7: Assessing and Deriving Estimators - Confidence Intervals, and Hypothesis Testing > Assessing and Deriving Estimators > Method of Moments - Quiz

# 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  $\theta$  from a  $U[0,\theta]$  distribution is derived using the method of moments?

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

#### **Explanation**

As shown in the lecture segment, estimating  $\theta$  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

- Module 5: Moments of a Random Variable,
   Applications to Auctions,
   Intro to Regression
- Module 6: Special
   Distributions, the
   Sample Mean, the
   Central Limit Theorem,
   and Estimation
- ▼ Module 7: Assessing and Deriving Estimators - Confidence Intervals, and Hypothesis Testing

#### <u>Assessing and Deriving</u> Estimators

Finger Exercises due Nov 14, 2016 at 05:00 IST

## <u>Confidence Intervals and</u> <u>Hypothesis Testing</u>

Finger Exercises due Nov 14, 2016 at 05:00 IST

#### Module 7: Homework

<u>Homework due Nov 07, 2016 at 05:00 IST</u>

likelihood estimation.

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You have used 1 of 2 attempts

## Question 2

1.0/1.0 point (graded)

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

lacksquare a.  $oldsymbol{ heta}$ 

 $\bullet$  b.  $\frac{\theta}{2}$ 

 $\circ$  c.  $rac{1}{n}\sum_{i=1}^n X_i$ 

 $\circ$  d.  $rac{2}{n}\sum_{i=1}^n X_i$ 

## **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.

### Exit Survey

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You have used 1 of 2 attempts

## **Question 3**

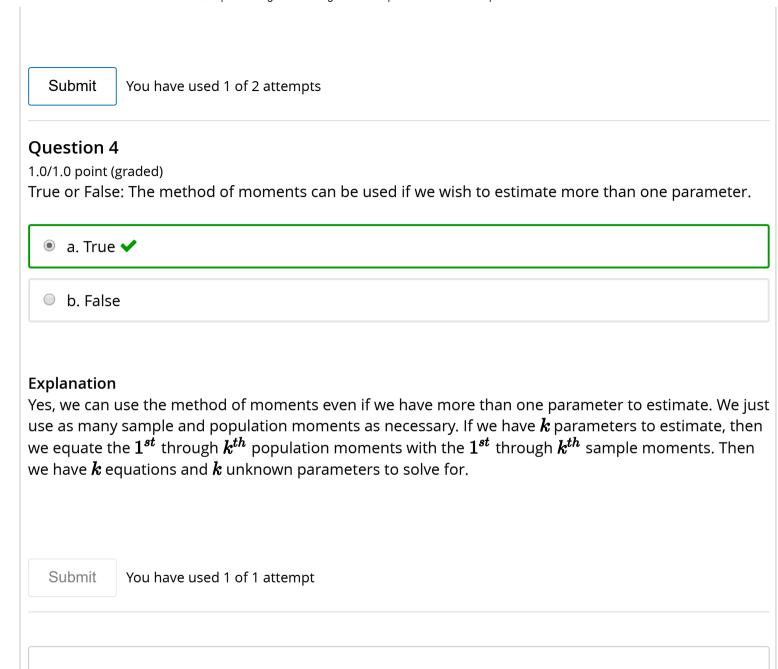
1.0/1.0 point (graded)

Which of the following is the second sample moment?

- $\circ$  a.  $rac{2}{n}\sum_{i=1}^n X_i$
- $\circ$  b.  $rac{1}{n^2}\sum_{i=1}^n X_i$
- lacksquare c.  $rac{1}{n}\sum_{i=1}^n {X_i}^2$  🗸
- $\circ$  d.  $rac{1}{2}(\sum_{i=1}^n X_i)^2$

## **Explanation**

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



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