

MITx: 14.310x Data Analysis for Social Scientists

<u>Hel</u>j

**Bookmarks** 

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# The t-distribution - Quiz

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### **Question 1**

1.0 point possible (graded)

Suppose we are sampling from a  $N(\mu, \sigma^2)$  distribution. Which of the following statements is true? (Select all that apply)

$$^{\square}$$
 a.  $rac{(n-1)s^2}{\sigma^2} \sim N(0,1)$ 

$$^{ extstyle eta}$$
 b.  $rac{(n-1)s^2}{\sigma^2}\sim \chi_n^2$ 

$$^{ extstyle ullet}$$
 c.  $rac{(n-1)s^2}{\sigma^2}\sim \chi^2_{n-1}$ 

$$lacksquare$$
 d.  $rac{(ar{X}-\mu)}{\sqrt{(rac{\sigma^2}{n})}}\sim \chi^2_{n-1}$ 

$$^{\square}$$
 e.  $rac{(ar{X}-\mu)}{\sqrt{(rac{\sigma^2}{n})}}\sim \chi_n^2$ 

- 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> <u>Estimators</u>

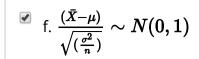
Finger Exercises due Nov 14, 2016 at 05:00 IST

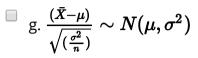
## Confidence Intervals and Hypothesis Testing

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

#### Module 7: Homework

Homework due Nov 07, 2016 at 05:00 IST





**V** 

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You have used 1 of 2 attempts

✓ Correct (1/1 point)

## Question 2

1/1 point (graded)

True or False: Let  $X_1,\ldots,X_n\sim N(\mu,\sigma^2)$  , and suppose  $\sigma^2$  is known, then

$$rac{ar{X}-\mu}{\sqrt{(rac{\sigma^2}{n})}}\sim t_n$$

- a. True
- b. False

#### Exit Survey

#### **Explanation**

Professor Ellison explained in class, that if  $X\sim N(0,1)$  and  $Z\sim \chi_n^2$  then  $rac{X}{\sqrt{rac{Z}{n}}}\sim t_n$  . This is useful

because it allows us to characterize the sample distribution in cases where the variance is unknown. Because we know that if  $X_1,\ldots,X_n$  are i.i.d from a standard normal distribution, then the **estimator** of the sample variance  $s^2$  follows a chi squared distribution with (n-1) degrees of freedom, so we appeal to this distributional fact to form the confidence interval. However, if the variance is known, then we know that

$$rac{ar{X}-\mu}{\sqrt{(rac{\sigma^2}{n})}}\sim N(0,1)$$

so we can construct the confidence interval.

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You have used 1 of 1 attempt

✓ Correct (1/1 point)

#### Discussion

**Topic:** Module 7 / The t-distribution - Quiz

**Show Discussion** 

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