

# UTAustinX: UT.7.20x Foundations of Data Analysis - Part 2



Week 5: Hypothesis Testing (More Than Two Group Means) > Lecture Videos > One-Way ANOVA

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# Readings

Reading Check due May 03, 2016 at 17:00 UTC

### **Lecture Videos**

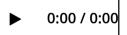
Comprehension Check due May 03, 2016 at 17:00 UTC

## **R Tutorial Videos**

### Pre-Lab

Pre-Lab due May 03, 2016 at 17:00 UTC

Lab



Download transcript

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Lab due May 03, 2016 at 17:00 UTC

#### **Problem Set**

Problem Set due May 03, 2016 at 17:00 UTC

1. ANOVA is an appropriate statistical measure when we want to:

(1/1 point)

- determine whether the hypothesized mean in one population is the same for two or more other populations.
- compare the means of three or more populations at once.
- estimate the size of the difference between two or more group means.
- ompare the distributions of two or more categorical variables.

2. In ANOVA, we calculate an F statistic. The F statistic is the ratio of:

(1/1 point)

- the difference in group means compared to the expected group difference in means.
- the variation in one group compared to the variation in the other.
- the variation within groups to the total variation.
- ullet the variation between groups to the variation within groups. ullet

3. If the null hypothesis for an ANOVA test is  $\mu_A=\mu_B=\mu_C$ , what is the appropriate alternative hypothesis?

(1/1 point)

- $\mu_A \neq \mu_B \neq \mu_C$
- At least one of the means is different.

 $\mu_A \neq \mu_B \text{ or } \mu_A \neq \mu_C$ 

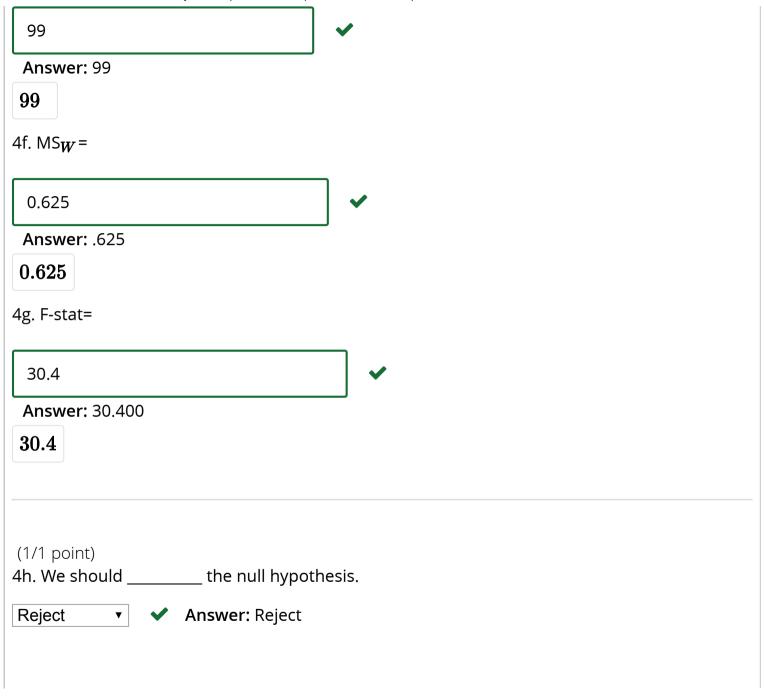
4. The source table below presents the results from an ANOVA comparing four treatment conditions with n=25 participants in each condition. Compare all the missing values. *Hint: Start with degrees of freedom*. (Round to 3 decimal places where needed.)

Source	ss	df	MS	F-statistic	F-critical
Between	[SS <sub>B</sub> ]	[df <sub>B</sub> ]	19	F-stat	2.699
Within	[SS <sub>W</sub> ]	[df <sub>W</sub> ]	[MS <sub>W</sub> ]		
Total	117	[df <sub>T</sub> ]			

(7/7 points)

 $4a. SS_B =$ 

57	<b>~</b>
Answer: 57	
57	
4b. SS <sub>W</sub> =	
60	<b>✓</b>
Answer: 60	
60	
4c. df <sub>B</sub> =	
3	<b>~</b>
Answer: 3	
3	
4d. $df_W$ =	
96	<b>~</b>
Answer: 96	
96	
4e. df $_{T}$ =	



(1/1 point)

4i. Assume your F-statistic is significant, suggesting that at least one treatment condition is different from the others. How many post-hoc group comparisons will you need to run?

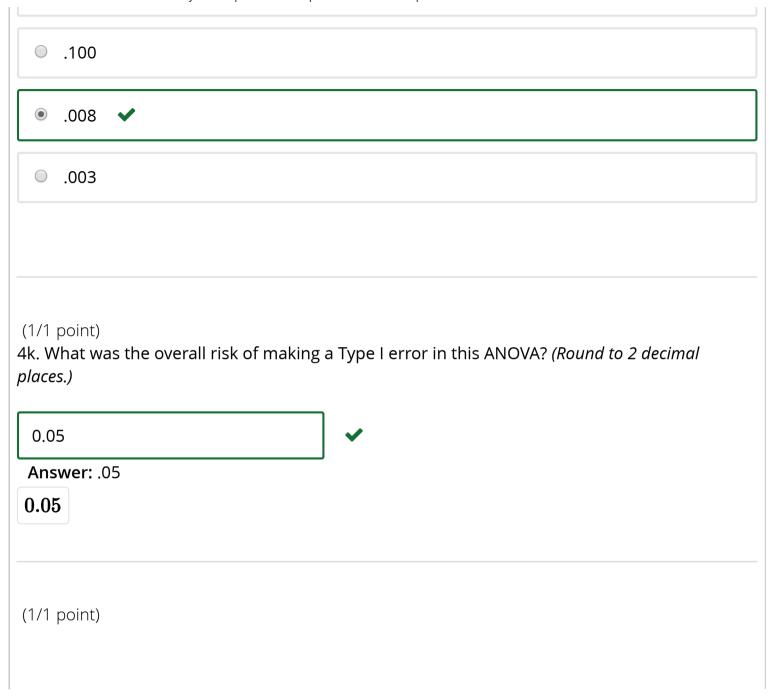
Remember the formula for group comparisons:  $\frac{k(k-1)}{2}$ 

- ~
- 0 15
- 0 10
- 0 12

(1/1 point)

4j. Using the Bonferroni correction, what significance level should you use for each post-hoc hypothesis test if you want an overall significance level of 0.05?

.050



4l. What would the risk of a Type I error have been if you had run multiple t-tests instead? Assume lpha=0.05 for each test. (Round to 2 decimal places)

Hint: 
$$1-(1-lpha)^C$$

0.26



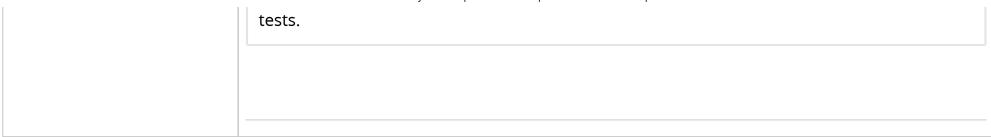
Answer: .26

0.26

(1/1 point)

4m. How would you interpret this difference in overall Type I error rate?

- The risk of missing a significant difference between means, when one really exists, is 5 times lower when you run an ANOVA.
- The risk of finding a difference between group means, when one does not really exist, is 5 times lower when you run an ANOVA. ✓
- The risk of falsely rejecting the null hypothesis is higher when you run an ANOVA.
- The risk of falsely failing to reject the null hypothesis is higher when you run multiple t-



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