

HOMEWORK: ONE-WAY CORRELATED ANOVA

1. Use the class lecture example where we examined the time course of a new psychotherapy (Pre, Post, 6 months, & 2 years). The data are posted on the web under class materials for **ANOVA Correlated**. The data are also available on the file menu of StatCenter's StatTool. Use StatTool to get the relevant means and do the correct F test.

A) The researcher would expect mental health scores would go up from pre- to post-test and that the effects of therapy might drop off a little over time but still remain well above the pre-test levels. Do the data means support this hypothesis? Sketch a graph of results.

B) Perform the correct F test. Write out a table with df, SS, MS and F for the appropriate F test, getting the information from StatTool. What is the calculated value of F?

C) Use the df to allow you to look up the critical value of F at $\alpha = .05$.

D) Do you reject H_0 or not? Explain. Sketch a graph of the F sampling distribution, labeling rejection region(s), etc. to support your explanation.

E) Based on your findings, what can you conclude about the time course of the new psychotherapy?

2. We will repeat the Homework for the 1 way independent ANOVA. But this time we will make repeated measures on one group of subjects rather than running different, independent groups of subjects. This will allow you to think about different ways to do the same research which require different statistical analyses.

A researcher thinks that music affects concentration. She hypothesizes that soft music will increase concentration, moderately loud music will have no effect on concentration, and loud music will detract from concentration.

She takes a sample 24 student volunteer participants. She has all participants come to the lab four different times, a week apart. Each time the participants come in they are given a reading comprehension task while listening to a tape of their favorite music. All participants are randomly assigned to a different condition (Soft, Moderate, Loud, or Control) Condition each time they come in. That way order of the conditions differs from participant to participant.

In the Soft Condition the music played at a low background level, similar to that played in a grocery store: It is there, but you can hardly hear it. In the Moderate Condition the music is played at listening level: The music is clearly present and can be easily heard. In the Loud Condition the music is played at a very high level. In the Control Condition only the soft sounds of an air conditioning system are heard.

The data are reading comprehension scores; the higher the score the greater the

comprehension.

- 1) What are the independent and dependent variables both abstractly and operationally?
- 2) What is (are) the scientific hypothesis(es)?
- 3) Suppose the means of the four conditions came out like this: M for Soft = 28.9; Moderate = 22.7; Loud = 15.6; and Control = 21.9. Graph them.
- 4) Does the data pattern support the hypotheses? Why or why not?
- 5) Suppose an F for repeated measures was calculated to be 5.62. What are the df for treatment? What are the df for treatment by subjects (residual or error)?
- 6) Find the critical value of F for $\alpha = .05$.
- 7) Can you reject H_0 or not? Explain. Draw a graph with rejection regions on the sampling distribution of F to support your explanation.
- 8) What do you conclude from this study?