Assignment 7. ANOVA: Due Thursday November 15 at 3PM

Use hypothesis testing to answer the questions below. ***For each problem (including the ones using Stata!), make sure to state your null and research hypotheses <u>in words</u> as well as using <u>formal notation</u>. After finishing the test, state your <u>formal conclusion</u> with regard to the null hypothesis as well as your <u>substantive answer</u> to the question.*** Please make sure to print out and include your Stata output with this assignment.

1. In a study testing the effectiveness and safety of a new drug, volunteer participants were randomly divided into four groups: Group 1 took a placebo pill, while the other three groups took three different doses of the drug. You are interested in the number of side effects that people experience on this new drug. You would like to find out whether there are differences among the four groups in the number of different side effects that the participants reported.
Placebo: 1, 1, 0, 0, 3
Low dose of the drug: 2, 1, 2, 3, 2
Medium dose of the drug: 1, 4, 3, 2, 0
High dose of the drug: 3, 3, 4, 4, 1
Using 90% confidence level, test whether the number of side effects depends on the level of exposure to this experimental drug. After completing the test, evaluate the probability of Type I and Type II error.

2. Using variables *degree* and *tvhours* in GSS2012 data, test whether the hours spent watching TV vary depending on people's levels of education. Use 99% confidence level for this assessment. After completing the test, evaluate the probability of Type I and Type II error.

3. For the previous problem (#2), conduct a post-hoc assessment using Stata and determine which pairs of educational groups are significantly different from each other. Again, use 99% confidence level for this assessment as well. List below all the pairs that ARE significantly different:

4. How many pairwise comparisons in total are you making in #3? Show how to use a formula to calculate that number.

5. In #3, when you are requesting post-hoc comparisons using Bonferroni correction, how exactly does Stata adjust the p-values in the output (that is, how is the adjustment calculated)?

6. Take the p-value for Less Than High School vs. Junior College comparison from the output in #3 and calculate what that p-value value would be prior to Bonferroni adjustment:

7. Does the Bonferroni adjustment make it easier or more difficult to reject the null hypothesis? Please circle your answer and explain.

a. Easier
b. More difficult

Explanation: