STAT 315 Chapter 10 Review Questions

Which of the following statements are true?

1. ANOVA tests for differences in the means of multiple groups
2. The null hypothesis being tested by the ANOVA for four groups is $H_0 : \mu_1 = \mu_2 = \mu_3 = \mu_4$
3. If we reject the null hypothesis, then we are concluding that all the group means are different from one another
4. ANOVA assumes that all groups have the same mean
5. ANOVA assumes that all groups have the same variance
6. The F statistic is large when average between group variation is smaller than average within group variation.
7. If the null hypothesis is true, then we should expect values of F around 1.
8. F can be positive or negative, but it can't be zero.
9. If we reject the null hypothesis, the ANOVA table will indicate which group means differ from each other.
10. Performing multiple comparisons without correcting for multiple testing will increase the probability of committing a Type II error.

Scenario A: A pharmaceutical company is investigating whether a new drug is effective at reducing LDL cholesterol in humans. They randomly assign 30 patients to one of three groups: those that receive the drug (Group A), those that don't receive the drug (Group B), and those that receive a sugar pill as a placebo (Group C). The researchers record the cholesterol before taking the drug and six weeks after starting medication. The change in cholesterol (post-pre, in mg/dL) is reported for each patient below:

Treatment	-5	-10	-10	-5	-7	0	+1	-10	-4	-5
Control	+1	+3	-4	-6	-2	+1	+5	-5	-1	-2
Placebo	-2	-4	-8	-6	-2	-3	0	+2	-4	-3

11. Write out the null hypothesis being tested.

12. Use R to complete the ANOVA F-table below.

	df	SS	MS	F	p
Treatment					
Error					
Total					

13. Based on the above results, should you reject or fail to reject the null hypothesis?

14. If you rejected the null hypothesis, conduct a multiple-comparisons using Tukey's Honest Significant Difference procedure to determine which means differ from one another.