Psyc 2111, Homework 8

Name:_____   **TA:** _____

Imagine you run an experiment testing the effect of weather on people's mood. You administer the PANAS (Positive and Negative Affect Scale) to one group of subjects on a rainy day and to another group on a sunny day and get the following data.

Rain: {35, 29, 72, 16, 58, 46, 47, 29, 85, 33}
Sun: {33, 32, 79, 20, 66, 47, 53, 39, 83, 38}

Now you'll do an independent-samples t-test to determine whether there's a reliable difference between the means of your samples.

1. Write the null hypothesis in words.

2. Write the null hypothesis as an equation.

3. Write the alternative hypothesis in words.

4. Write the alternative hypothesis as an equation.

5. Calculate the means of your samples.

6. Calculate the mean square based on both samples.

7. Calculate the standard error for the difference between sample means.

8. Calculate the t statistic for testing the null hypothesis you wrote above.

9. The two-tailed critical value for this test is ±2.10. Which hypothesis do the data support?

Now imagine you had the same data, but the samples were based on a single set of subjects. That is, the first entries in both samples are from the same person, the second entries are from a second person, and so on.

10. What kind of test should you do now?

11. Calculate the difference scores and their mean.

12. Calculate the mean square (i.e., the sample variance) from your difference scores.

13. Calculate the standard error of your answer in question 11.

14. Calculate the new t statistic.

15. The two-tailed critical value for this test is ±2.26. Which hypothesis do the data support now?

16. Think about why the conclusion changed from question 9 to question 15. Notice the mean difference score from question 11 is the same as the difference of your means in question 5. So, the effect size is the same, but it was reliable in one case and not in the other. This is because the standard error changed, which in turn is because the mean square changed. Look at your mean squares from questions 6 and 12, and think about what those numbers mean. Write some thoughts here on why the mean square differs so much between tests, and why this difference explains the different conclusions between the two tests.