Fun with dependent *t* **ANSWERS**

These are the scores from the same students who took 2 exams (*r* = .75):

 Exam 1 Exam 2

 92 84

 67 75

 89 97

 82 87

 73 72

 59 75

 70 88

 72 78

You think the exams were different in difficulty.

 a. H0: The population mean exam score for the two groups is the same.

b. HA: The population mean exam score for the two groups is different.

c. Why should a dependent *t* test be used? The strong relationship between the groups (*r* = .75) AND/OR The

 same people took both tests.

d. How does the dependent *t* test use the relationship between each pair of scores to increase power? It allows

 you to subtract some of the error contributing to score differences in the two groups. This makes your

*t* statistic bigger.

e. Do the test: *t*(7) = 2.18

f. What do you decide about your Ho? The cut off for df = 7, two tailed, is 2.365 so you retain H0

g. your power for this comparison is .26—explain what this means. You can reject the null 26% of the time

with this experiment design.

h. Comparing these same groups using an independent *t* would double your df to 14 (a good thing). Why is this a

 bad way to increase power here? You would be unable to take advantage of the relationships between

 the pairs of scores to reduce error. Your *t* statistic would be smaller.

i. instead, you increase the number of pairs of scores to 16. Recalculate your paired *t* test (leave everything else

 in the formula in part e. the same). Consider why this method of increasing df does increase power. Your

 denominator will be smaller (bigger *t*) and your cut off in the distribution will be closer to the mean.

 j. Is the statistic now big enough to reject? Yes. New *t*(15) = 3.92. New cutoff is 2.132.

 k. power is now .55. explain what this means. You can reject the null 55% of the time with this

 new experiment design.