Stat 2470, 4/2 Discussion Questions Name _____

Instructions: Attempt to answer these questions by reading the textbook or with online resources before coming to class on the date above.

1. Two-sample T-tests assume that the two samples are independent and allow for the possibility of different sample sizes. What different assumptions are made for paired T-tests?

the same subject was used in both sample sets; sample sizes must be the same, and we always have to have raw data since we need to calculate the difference between each matched pair

2. Describe the procedures for testing paired samples.

① find the difference between each matched pair d_i
② state null & alternative hypotheses about $\bar{d}$.
③ calculate the test statistic and convert to a p-value
④ reject or fail to reject H_0

3. What is the formula for the confidence interval for paired samples?

$$\bar{d} \pm t_{\alpha/2,\, n-1} \cdot \frac{s_d}{\sqrt{n}}$$

4. Which tests in the calculator (and which confidence interval functions) are used for the paired T-test?

the (one sample) t-test
& Tinterval

5. Why is using the independent two-sample test incorrect for testing paired data? When can we get away with it?

because we may get different results. The two-sample test assumes independence; the paired test is for dependent data; can only use if we take relationship into account w/ p.

6. What is the formula for the test statistic for a difference between two proportions?

$$Z = \frac{\hat{p}_1 - \hat{p}_2 - (p_1 - p_2)}{\sqrt{\frac{p_1 q_1}{m} + \frac{p_2 q_2}{n}}}$$

7. How do we do the two-proportion test in the calculator?

Stat → Test → 2Prop2Test (TI-84)

recall x_1, x_2 whole #'s & p_1, p_2 are decimals

8. What are the formulas for calculating β for this test?

one-tailed : $\Phi\left[\frac{z_\alpha\sqrt{\bar{p}\bar{q}\left(\frac{1}{m}+\frac{1}{n}\right)} - (p_1-p_2)}{\sigma}\right]$ or $1-\Phi\left[\frac{z_\alpha\sqrt{\bar{p}\bar{q}\left(\frac{1}{m}+\frac{1}{n}\right)} - (p_1-p_2)}{\sigma}\right]$

two-tailed : $\Phi\left[\frac{z_{\alpha/2}\sqrt{\bar{p}\bar{q}\left(\frac{1}{m}+\frac{1}{n}\right)} - (p_1-p_2)}{\sigma}\right] - \Phi\left[\frac{-z_{\alpha/2}\sqrt{\bar{p}\bar{q}\left(\frac{1}{m}+\frac{1}{n}\right)} - (p_1-p_2)}{\sigma}\right]$ $\sigma = \sqrt{\frac{p_1q_1}{m} + \frac{p_2q_2}{n}}$

9. What is the formula for calculating a sample size for a specific α and β? What assumption is made in deriving this formula?

$$n = \frac{\left[z_\alpha\sqrt{(p_1+p_2)(q_1+q_2)/2} + z_\beta\sqrt{p_1q_1+p_2q_2}\right]^2}{d^2} \qquad d = p_1 - p_2$$

10. What is the formula for the confidence interval?

$$\hat{p}_1 - \hat{p}_2 \pm z_{\alpha/2}\sqrt{\frac{\hat{p}_1\hat{q}_1}{m} + \frac{\hat{p}_2\hat{q}_2}{n}}$$

all $m\hat{p}_1, m\hat{q}_1, n\hat{p}_2, n\hat{q}_2 \geq 10$

11. What conditions must be met to use this formula?

the usual binomial conditions on both samples

12. How do we calculate the confidence interval for the difference of two proportions in the calculator?

Stat - Tests → 2Prop2Test (TI-84)

x_1, x_2 whole #'s

p_1, p_2 decimals