STAT 614 TEST2

1) In a survey of 3611 adult Americans 18 years and older conducted in July 2010 by SmartRevenue, it was found that 542 have used their smartphone to make a purchase. Use and show R code to construct a 90% confidence interval for the proportion of Americans who use their smartphone to make a purchase

2) A sample of 25 Physics test scores has a mean of 71 and a standard deviation of 6.5. As demonstrated in the notes, use a step by step approach to obtain a 95% confidence interval for the mean of the population. SHOW ALL OF YOUR WORK **(Do not use R for this problem)**

3) Central Middle School has calculated a 95% confidence interval for the mean height (**) of 11-year-old boys at their school and found it to be 56 ± 2 inches.

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|  | **Determine whether each of the following statements is true or false.** | |
| A) | There is a 95% probability that ** is between 54 and 58. | |
| B) | There is a 95% probability that the true mean is 56, and there is a 95% chance that the true margin of error is 2. | |
| C) | If we took many additional random samples of the same size and from each computed a 95% confidence interval for **, approximately 95% of these intervals would contain **. | |
| D) | If we took many additional random samples of the same size and from each computed a 95% confidence interval for **, approximately 95% of the time ** would fall between 54 and 58. | |
| Answer: | | A) B) C) D) |
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4) In a study published in the American Journal of Psychiatry, researchers wanted to measure the effect of alcohol on the development of the hippocampal region in adolescents. The hippocampus is the portion of the brain responsible for long-term memory storage. The researchers randomly selected 12 adolescents with alcohol use disorders. They wanted to determine whether the hippocampal volumes in the alcoholic adolescents were less than the normal volume of 9.02 cm3. An analysis of the sample data revealed that the hippocampal volume is approximately normal with a sample mean of 8.10, and a standard deviation of .07. Conduct a test of significance at the level of .01. Use the step by step method illustrated in the notes. Do not use R for this problem (Show all of your work) Your procedure should have the following steps;

a) State the null and the alternative hypothesis

b) Find your t statistic (Show all of your work)

c) Find your degrees of freedom

d) Find your pvalue (<https://www.danielsoper.com/statcalc/calculator.aspx?id=8>)

e) Write your conclusion to reject or fail to reject, based on the p value

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| 5) | A random experiment was conducted to see if a newly formulated drug produced a different effect on the mean time to recovery than that achieved using the standard drug. It is known that the mean time to recovery for the standard drug is 26 days. Following an extensive random experiment involving 65 patients, the data gathered were used to construct a 95% confidence interval estimate for the mean recovery time (in days) for patients on the new drug. The 95% confidence interval was found to be (24.6, 27.8). What conclusion can be reached in this case concerning the new drug relative to the standard drug? | |
| A) | There is evidence at the 0.05 level of significance that the new drug is better than the standard drug. | |
| B) | The experimenter should reject the claim that the new drug is the same as the standard drug with respect to mean recovery time. | |
| C) | There is insufficient evidence to reject the claim that there is no difference between the new drug and the standard drug with respect to mean recovery time. | |
| D) | The confidence interval contains the hypothesized value for ** and hence it is significant at the 0.05 level. | |
| E) | There is reason to believe that the standard drug is better than the new drug and hence the new drug should not be prescribed. | |
| Answer: | |  |

6) Sixteen people volunteered to be part of an experiment. All 16 people were Caucasian, between the ages of 25 and 35, and were supplied with nice clothes. Eight of the people were male and eight were female. The question of interest in this experiment was whether females receive faster service at restaurants than males. Each of the eight male participants was randomly assigned a restaurant, and each of the eight females was randomly assigned to one of these same eight restaurants. One Friday night, all 16 people went out to eat, each one alone. The male and female assigned to the same restaurant would arrive within 5 minutes of each other, with the order determined by flipping a coin (male first or female first). Each person then ordered a similar drink and a similar meal. The time (in minutes) until the food arrived at the table was recorded. They are shown below:

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| Restaurant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Male | 22 | 14 | 16 | 26 | 18 | 13 | 9 | 27 |
| Female | 25 | 12 | 13 | 21 | 21 | 14 | 9 | 16 |

Assume that the differences are Normally distributed.

The hypotheses being tested are

H0: µm - µf = 0

Ha: µm - µf > 0 alpha = .05

a) Use and show R code that will produce the t statistic, the p value, and the 95% confidence interval.

b) Write your conclusion to reject the null hypothesis or not base on the p value and the confidence interval.

7) A test of significance has the following structure and designations:

H0: µ = 26 , Ha: µ < 26 , HT = 24 , α = .05, n = 50, σ = 5.5

a) Find the type 1 error

b) Find the type 2 error (SHOW ALL OF YOUR WORK)

c) Find the power of the test.