Math 160 Final Exam practice for chapters 7 -10

1) True / False

   A) The value of the χ^2 random variable can be negative. _____

   B) The correlation coefficient r measures the strength of a linear relationship._____

   C) α represents the probability of making a type I error (rejecting the null hypothesis when it's actually true) _____

A study was conducted to determine whether magnets are effective at treating back pain. One group was given the magnet treatment, while the other group was given the sham treatment. The results are shown below where measurements are centimeters on a pain scale. Do not assume the population standard deviations are equal.

Magnet:
$n_1 = 23,\ \bar{x}_1 = 0.47,\ s_1 = 0.95$

Sham: (similar to a placebo)
$n_2 = 25, \bar{x}_2 = 0.32,\ s_2 = 1.45$

2) Construct a 95% confidence interval for the difference between the two population means. Round to the thousandths place.

3) Based on the results, does it appear that the two populations have different means? EXPLAIN your answer using the interval from the previous answer.

Quarters are currently minted with weights having a mean of 5.977 and a standard deviation of 0.069. New equipment is being tested in an attempt to improve quality by reducing variation. A simple random sample of 25 quarters is obtained from those manufactured with the new equipment, and this sample has a standard deviation of 0.042. Use a 0.05 significance level to test the claim that quarters manufactured with the new equipment have weights with a standard deviation less than 0.069

4) What is the null hypothesis? _____

5) What is the alternate hypothesis?_____

6) Find the test statistic

7) The critical value is

8) **Which is the correct conclusion for the problem. _____**

a) The sample data support the claim that quarters manufactured with the new equipment have weights with a standard deviation less than 0.069

b) There is not sufficient sample evidence to support the claim that quarters manufactured with the new equipment have weights with a standard deviation less than 0.069

c) There is sufficient evidence to warrant rejection of the claim that quarters manufactured with the new equipment have weights with a standard deviation less than 0.069

d) There is not sufficient evidence to warrant rejection of the claim that quarters manufactured with the new equipment have weights with a standard deviation less than 0.069

Does the new equipment appear to be effective in reducing the variation of weights? Yes/No

A social worker is interested in looking at the average daily calorie intake from children in the inner city. A sample of **six** children is taken, and the following results were obtained: 1125, 1019, 1954, 1546, 1418, 980

9) Construct a 99% confidence interval estimate of the mean daily caloric intake for all inner city children. Round your answer to the tenths place.

10) A recent poll reported that 27% of respondents carrying heavy mortgage or credit card debt also said that they had stomach ulcers. **Find the sample size needed** to estimate the population proportion of respondents carrying heavy debt who also have stomach ulcers. We want to be 95% confident that the estimate is within 1 percentage point of the true proportion.

A researcher claims that listening to Mozart improves scores on math quizzes. A random sample of five students took math quizzes, first before and then after listening to Mozart. Test the claim that listening to Mozart improves scores on math quizzes. Use a .01 significance level.

Before	75	50	80	85	95
After	85	45	85	95	95

11) The null hypothesis is _____

12) The alternate hypothesis is _____

13) The test statistic is _____

14) The p-value is _____

15) Choose one. a) FAIL TO REJECT H_0 b) REJECT H_0.

16) Does listening to Mozart improve scores on math quizzes? Yes / No

A study compared the body weight and brain weight for a random sample of mammals. We are interested in estimating brain weight based on body weight.

Body Weight (x) (kilograms)	52.16	60	27.66	85	36.33	100	35	62
Brain Weight (y) (grams)	440	81	115	325	119.5	157	56	1320

Round to the thousandths place

17) Find the value of the linear correlation coefficient (r)

18) Is there a significant linear correlation? (This is not just a "yes" or "no" question, show **all steps in a hypothesis test** leading to your answer)

19) If a significant linear correlation exists, find the regression **equation**. If there is no significant linear correlation, find $\overline{y}$.

20) Find the best predicted brain weight for a mammal with a body weight of 83 kg.

KEY:

1) a) False b) True c) True
2) $-0.559 < \mu_1 - \mu_2 < 0.859$
3) Since the confidence interval contains zero then it is possible for $\mu_1 - \mu_2 = 0$ if this is the case then $\mu_1 = \mu_2$ and we conclude that there is no difference between the two populations.

4) $H_0 : \sigma = .069$
5) $H_1 : \sigma < .069$ (*claim*)
6) $\chi^2 = 8.892$
7) *critical value is* $\chi^2_L = 13.848$ *reject* H_0 since test statistic falls in critical region.
8) *A / Yes*

9) $722.5 < \mu < 1958.2$ (using T - interval)
10) n = 7572

11) $H_0 : \mu_d = 0$
12) $H_1 : \mu_d < 0$ (*claim*)
13) $t = -1.372$
14) $p - value\, is$ 0.1210 since this is greater than the significance level α FAIL to *reject* H_0
15) *A*
16) *NO*

17) $r = .171$ (STAT -> calc -> LinReg L1,L2)
18) 2 *methods here* –
$H_0 : \rho = 0$ (no significant linear correlation)
$H_1 : \rho \neq 0$ (*significant* linear correaltion)
Test Statistic $r = .171$
Critical Value is $+/- 0.707$ since test statistic is less than the absolute value of the critical value.
Fail to reject H_0 so there is no significant linear correlation.
19) *Since there is no* significant linear correlation use $\bar{y}$ for predictions.
$\bar{y} = 326.69$
20) 326.69 (the mean is the best predictor since there is no significant linear correlation. Do not use the regression equation for predictions.)