Discussion 5

Name_____

SHORT ANSWER. Write your answer in the space provided or on a separate sheet of paper.

Provide an appropriate response.

1) Jenny is testing a claim about a population mean. The hypotheses are as follows.

H_0: $\mu = 50$

H_1: $\mu > 50$

She selects a simple random sample and finds that the sample mean is 54.2. She then does some calculations and is able to make the following statement: If H_0 were true, the chance that the sample mean would have come out as big (or bigger) than 54.2 is 0.3. What name is given to the value 0.3? Do you think that she should reject the null hypothesis? Why or why not?

2) Suppose that you wish to test a claim about a population mean. Which distribution should be used given that the sample is a simple random sample, σ is unknown, n = 15, and the population is not normally distributed?

3) David wants to test a claim about a population mean. The population standard deviation is unknown, the sample is a simple random sample of size 20, and the population is normally distributed. In this case, the t-test should be used since σ is unknown. If David incorrectly uses the normal distribution instead of the t-distribution, will he obtain a P-value that is too big or too small? Explain your thinking. Will he be more likely or less likely to reject the null hypothesis than if had correctly used the t-distribution?

Assume that a hypothesis test of the given claim will be conducted. Identify the type I or type II error for the test.

4) A skeptical paranormal researcher claims that the proportion of Americans that have seen a UFO is less than 2 in a thousand. Identify the type I error for the test.

5) A psychologist claims that more than 3% of adults suffer from extreme shyness. Identify the type II error for the test.

Identify the null hypothesis, alternative hypothesis, test statistic, P-value, conclusion about the null hypothesis, and final conclusion that addresses the original claim.

6) In a sample of 167 children selected randomly from one town, it is found that 37 of them suffer from asthma. At the 0.05 significance level, test the claim that the proportion of all children in the town who suffer from asthma is 11%.

Assume that a simple random sample has been selected from a normally distributed population and test the given claim. Identify the null and alternative hypotheses, test statistic, critical value(s) or P-value, and state the final conclusion that addresses the original claim.

7) A large software company gives job applicants a test of programming ability and the mean for that test has been 160 in the past. Twenty-five job applicants are randomly selected from one large university and they produce a mean score and standard deviation of 183 and 12, respectively. Use a 0.05 level of significance to test the claim that this sample comes from a population with a mean score greater than 160. Use the critical region to make your decision.

Test the indicated claim about the means of two populations. Assume that the two samples are independent simple random samples selected from normally distributed populations. Do not assume that the population standard deviations are equal.

8) A researcher was interested in comparing the amount of time (in hours) spent watching television by women and by men. Independent simple random samples of 14 women and 17 men were selected, and each person was asked how many hours he or she had watched television during the previous week. The summary statistics are as follows.

Women	Men
$\bar{x}_1 = 12.1$ hr	$\bar{x}_2 = 14.2$ hr
$s_1 = 3.9$ hr	$s_2 = 5.2$ hr
$n_1 = 14$	$n_2 = 17$

Use a 0.05 significance level to test the claim that the mean amount of time spent watching television by women is smaller than the mean amount of time spent watching television by men. Use the critical value or critical region to make your decision.

1) 0.3 is the P-value. Since the P-value is large, she should not reject the null hypothesis. If H_0 were true, the sample mean could easily be as big as 54.2 by chance. So there is not sufficient evidence to reject H_0 in favor of the alternative H_1: $\mu > 50$.
2) Neither the normal nor the t-distribution
3) He will obtain a P-value that is too small. The normal distribution is narrower than the t-distribution so corresponding to any given test statistic there will be a smaller area in the tail. Since he will obtain a P-value that is too small, he will be more likely to reject the null hypothesis than if had correctly used the t-distribution.
4) Reject the claim that the proportion of Americans that have seen a UFO is equal to 2 in a thousand when that proportion is actually 2 in a thousand.
5) Fail to reject the claim that the percentage of adults who suffer from extreme shyness is equal to 3% when that percentage is actually greater than 3%.
6) H_0: $p = 0.11$. H_1: $p \neq 0.11$. Test statistic: $z = 4.61$. P-value: $p = 0.0001$.
   Critical values: $z = \pm 1.96$. Reject null hypothesis. There is sufficient evidence to warrant rejection of the claim that the proportion of all children in the town who suffer from asthma is 11%.
7) H_0: $\mu = 160$. H_1: $\mu > 160$. Test statistic: $t = 9.583$. P-value < 0.005. Reject H_0. There is sufficient evidence to support the claim that the mean is greater than 160.
8) H_0: $\mu_1 = \mu_2$
   H_1: $\mu_1 < \mu_2$
   Test statistic: $t = -1.283$
   Critical value: $t = -1.701$
   Do not reject H_0. At the 5% significance level, there is not sufficient evidence to support the claim that the mean amount of time spent watching television by women is smaller than the mean amount of time spent watching television by men.