TEST PREP 4

1) A manufacturer of scissors designs a new model they believe will be more comfortable for left-handed people. Nationally, about 12% of adults identify as left-handed. To test their belief, they conduct a survey of adults who have purchased their new scissors and find that in their sample, a higher proportion are left-handed. Express the appropriate null and alternative hypotheses in their symbolic forms.

2) Based on the information below, circle the words in the parentheses that represent the correct conclusion.

Rejection region $Z<-2.054$ Test statistic $Z=-2.112$ Level of significance $\alpha=0.02$

"We will (accept/fail to reject/reject) the null hypothesis, as there is (sufficient/insufficient) evidence at the 2% significance level."

3) A telemarketing company believes that 15% of people contacted will subscribe to their service. A new training program for their callers is implemented, and the company wants to know if the subscription rate has increased. A random sample of 300 calls made by trained callers resulted in 51 subscriptions. Using a significance level of 5%, determine the appropriate rejection region for this test.

A) $Z<-1.645$
B) $Z>-1.645$
C) $Z<1.645$
D) $Z>1.645$

4) A cereal company claims that the average weight of cereal in their boxes is 360 grams. A consumer advocacy group suspects that the actual average weight is less than 360 grams. They take a random sample of 25 cereal boxes and find the average weight to be 355 grams with a standard deviation of 8 grams. Using a significance level of 1%, determine the appropriate rejection region for this test.

A) $t<-2.093$
B) $t>2.093$
C) $t<-2.492$
D) $t>2.492$

5) What is the probability that a Type I error will be made for a rejection region of $t<-1.708$, with 20 degrees of freedom? Label and shade the appropriate area on the graph.

6) A botanist believes that a new fertilizer will result in taller than average sunflower plants. The average height of mature sunflower plants of this variety is known to be 6.2 feet. Assume that the heights are approximately normally distributed. The botanist plants a sample of six sunflowers using the new fertilizer and records their mature heights (in feet):

6.8	7.1	6.5	7.6	6.9	7.2

A) Determine the values of $\bar{X}$, S, and n:

B) Use the built-in statistical features in your calculator or formulas to perform the test of hypothesis. Report the test statistic and p-value below:

C) Based on the sample and using $\alpha=0.05$, what did the botanist conclude about whether the new fertilizer does tend to result in taller than average sunflower plants? Circle the correct answer choice: Yes No

7) Suppose that a hypothesis test is conducted using $\alpha=0.05$. If a p-value of 0.038 is observed, what conclusion will be made? Indicate your answer by circling the correct words in the parentheses.

"Since the p-value is (less/greater) than the significance level, the researcher would (reject/fail to reject) the null hypothesis."

8) A tutoring service claims that their program increases students' test scores by an average of 10 points. An education researcher suspects that the actual mean improvement is different from 10 points. In a sample of 60 students who used the tutoring service, the sample mean score improvement was 8.5 points with a sample standard deviation of 5 points.

A) Determine the direction of the hypothesis test (circle the correct answer):

Left tailed Right tailed Two tailed

B) Use the built-in statistical features in your calculator or an appropriate formula to calculate the test statistic for this test of hypotheses:

Test statistic=_____

C) Based on this sample and using a 5% level of significance, what would the education researcher conclude about whether the actual mean improvement is different from 10 points?

Yes No

10) Consider a hypothesis test with Ha:p=0.45, a sample size of n=500, and a sample proportion p^=0.42. Give each of the following values:

A) The number of successes, X, out of 500.

B) The probability of failure, assuming the null hypothesis is correct.

C) The test statistic for this test of hypotheses.

D) The observed significance level (p-value) for this hypothesis test.