Week 10 - Quiz

Problem 1.

The proportion of defective items is not allowed to be over 15%. A buyer wants to test whether the proportion of defectives exceeds the allowable limit. The buyer takes a random sample of 100 items and finds that 19 are defective. State the null and alternative hypotheses for this test.

A) Ho: $p \leq .15$, Ha: $p > .15$
B) Ho: $p < .15$, Ha: $p > .15$
C) Ho: $p \neq .15$, Ha: $p > .15$
D) Ho: $p < .15$, Ha: $p > .15$

Answer - A: they want it to be less than 15%, but the buyer thinks that the defective items exceed 15%

Problem 2.

Conduct a test to determine whether or not the population proportion of voters in favor of proposal A is greater than 50%. In a random sample of 200 voters, 110 said that they were in favor of this proposal. Compute the test statistic. [*Hint: pick the one that is closest to what you obtained*.]

A) TS = 1.41
B) TS = 40.40
C) TS = -1.41
D) TS = 40

Answer - A: you get this answer when you plug it into the calculator and set it to not equal p

Problem 3.

The proportion of defective items is not allowed to be over 15%. A buyer wants to test whether the proportion of defectives exceeds the allowable limit. The buyer takes a random sample of 100 items and finds that 16 are defective. Find the p-value. [*Hint: pick the one that is closest to what you found from the table*]

A) 0.39
B) 0.61
C) 0.42
D) 0.58

Answer - A: Calculate the TS and then using the table to find the right-tail area (this is a right-tailed test).

Problem 4.

A recent newspaper article claimed that the President's approval rating is 46%; however, a sample of 80 U.S. citizens shows that 43 of them approve of the President's performance. At a 0.05 level of significance, you are interested in determining if there is evidence that the President's approval rating is actually higher.

What is the alternative hypothesis for this test?

A). $p = .46$
B). $p \neq .46$
C). $p < .46$
D). $p > .46$

Answer – D. The keyword "actually higher". It is a right-tailed test.

Problem 5.

A recent newspaper article claimed that the President's approval rating is 46%; however, a sample of 80 U.S. citizens shows that 43 of them approve of the President's performance. At a 0.05 level of significance, you are interested in determining if there is evidence that the President's approval rating is actually higher.

What is the test statistic for this hypothesis test? (Hint: choose the one that is closest to yours)

A). TS = -1.35
B). TS = 1.35
C). TS = -.538
D). TS= -.538

Answer- B.
(0.535-0.46)/sqrt(0.46*0.54/80) = 1.345955 or (0.535-0.46)/sqrt(0.465*0.535/80) = 1.34494

Problem 6.

A recent newspaper article claimed that the President's approval rating is 46%; however, a sample of 80 U.S. citizens shows that 43 of them approve of the President's performance. At a 0.05 level of significance, you are interested in determining if there is evidence that the President's approval rating is actually higher.

What is the p-value for this hypothesis test? (Hint: Draw a normal density curve and label all information on the curve before going to the table. Again, choose the one that is closest to yours.)

A). 0.082
B). 0.164
C). 0.702
D). 0.298

Answer-A. This is a right-tailed test. The p-value is the tail area to the right of the test statistic TS = 1.35

Problem 7.
The heights (in inches) of males in the United States are believed to be approximately normally distributed with a mean μ. The average height of a random sample of 25 American adult males is found to be $\bar{x}$= 69.72 inches, and the standard deviation of the 25 heights is found to be s = 4.15 inches. The standard error (or standard deviation) of $\bar{x}$ is
A). 0.17
B). 0.41
C). 0.69
D). 0.83
E). 2.0

Answer-D. 4.15/sqrt(25) = 4.15/5 = 0.83.

Problem 8
An animal rights group has been very supportive of a new silicon product that caps the nails on cats instead of surgically declawing the pets. The company that makes the caps claims they last for an average of 68 days before needing to be replaced. Before publicly advertising their support of the product, the animal rights group plans to run a test to see if the caps last less than 68 days. What would be the appropriate hypotheses for this study?

A). Ho : $\mu \leq$ 68 days, vs Ha : $\mu >$ 68 days
B). Ho : $\mu \geq$ 68 days, vs Ha : $\mu <$ 68 days
C). Ho : μ = 68 days, vs Ha : $\mu \neq$ 68 days
D). Ho : $\bar{x} \leq$ 68 days, vs Ha : x > 68 days
E). Ho : $\bar{x} \geq$ 68 days, vs Ha : x < 68 days

Answer- C. " … claims they last for an average of 68 days …" implies Ho: μ = 68 days.

Problem 9

Researchers have claimed that the average number of headaches per student during a semester of Statistics is 11. Statistics students believe the average is higher. In a sample of n = 16 students, the mean is 12 headaches with a deviation of 2.4. Which of the following represent the null and alternative hypotheses necessary to test the students' belief?
A) Ho: μ = 11 vs. Ha: $\mu \neq$ 11
B) Ho: $\mu \geq$ 11 vs. Ha: $\mu <$ 11
C) Ho: $\mu <$ 11 vs. Ha: μ = 11
D) Ho: $\mu \leq$ 11 vs. Ha: $\mu >$ 11

Answer- D. The claim is “the average is higher”. That is μ > 1. Therefore, Ho: $\mu \leq 11$ vs. Ha: $\mu > 11$.

Problem 10

A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but now are beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was $215.00. A random sample of n = 22 cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if the average price of all digital cameras is now more than $215.00. Find a <u>rejection region</u> [defined by the critical value(s)] appropriate for this test if we are using $\alpha = 0.05$.

A). Reject Ho if TS > 1.645
B). Reject Ho if TS > 2.080 or TS < -2.080
C). Reject Ho if TS > 1.72
D). Reject Ho if TS > 1.717

Answer-C. “more than $215” implies that the claim is: $\mu > 215$. Therefore, it is a right-tailed test. The only critical value is on the right tail of the t-density curve with df = 22-1 = 21.

Problem 11

The water diet requires you to drink 2 cups of water every half hour from when you get up until you go to bed but eat anything you want. Four adult volunteers agreed to test this diet. They are weighed prior to beginning the diet and 6 weeks after. Their weights in pounds are

Person	1	2	3	4	mean	s.d.
Weight before	180	125	240	150	173.75	49.56
Weight after	170	130	215	152	166.75	36.09
Difference	10	-5	25	-2	7	13.64

Test the claim that the water diet actually reduces weight at a significance level of 0.05. What is the critical value associated with the test?

A). -1.645
B). -2.353
C). -2.132
D). -2.575

Answer-B. This is a left-tailed t-test with degrees of freedom 4-1 = 3.

Problem 12

A test is conducted for H_0: μ = 34, with σ = 5. A sample of size 25 is selected. The standard error of the sampling distribution is

A). 0.1
B). 5.0
C). 1.0
D). 0.2

Answer- C. 5/sqrt(25) = 1.0

Problem 13

A one-sample *t*-test is conducted on $H_0 : \mu = 81.6$ vs $H_0 : \mu \neq 81.6$. The sample has $\bar{x} = 84.1$, *s* = 3.1, and *n* = 25. The test statistic is

A). 4.03
B). 15.5
C). 3.95
D). 3.1

Answer-A. simply use the formula to find the test statistic.

Problem 14

If performing a hypothesis about a population mean that $\mu = \mu_0$ at significant level 0.05, with σ estimated by *s* and *n* = 20, the correct critical value for *t* is
A). 1.729
B). 1.725
C). 2.086
D). 2.093

Answer-D. This is a two-tailed t-test with a significance level of 0.05.

Problem 15

Suppose we were interested in determining if there were differences in the average prices between two local supermarkets. We randomly pick six items to compare at both supermarkets. Which statistical procedure would be best to use for this study?
A). paired t procedure
B). one-sample t-test
C). two-sample normal test
D). none of the listed tests

Answer-A. The two supermarkets can be considered "before" and "after", so the same item is considered to be priced "before" and "after".