

Homework #8

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Express the null hypothesis.

- 1) Which is the null hypothesis for testing that the average (μ) miles per gallon of a new SUV called the Aquarius is better than 25. 1) _____
- A) $H_0: \mu \neq 25$
 - B) $H_0: \mu = 25$
 - C) none of these
 - D) $H_0: \mu \neq 25$
 - E) $H_0: \mu = 50$

Select the most appropriate answer.

- 2) Which P-value provides the strongest evidence that the data are consistent with H_0 ? 2) _____
- A) 0.05
 - B) 0
 - C) 0.50
 - D) 0.65
 - E) 0.01
- 3) Given $H_a \neq p_0$. What is the P-value if the test statistics is calculated to be $z = -0.12$? 3) _____
- A) 0.10
 - B) 0.90
 - C) 0.95
 - D) 0.12
 - E) 0.05

Find the P-value for the indicated hypothesis test.

- 4) A manufacturer claims that fewer than 6% of its fax machines are defective. In a random sample of 100 such fax machines, 5% are defective. Find the P-value for testing the manufacturer's claim. 4) _____
- A) 0.16
 - B) 0.06
 - C) 0.17
 - D) 0.34
 - E) 0.33

For the given sample data and null hypothesis, compute the value of the test statistic, z

- 5) A claim is made that the proportion of children who play sports is less than 0.5, and the sample statistics include 1933 subjects with 30% saying that they play a sport. 5) _____
- A) 35.90
 - B) 17.59
 - C) 0.50
 - D) -17.59
 - E) -35.90

State conclusion to significance test in terms of the null hypothesis

- 6) A nationwide survey of American homeowners revealed that 65% have one or more lawn mowers. A lawn equipment manufacturer, located in Omaha, feels the estimate is too low for households in Omaha. Can the value 0.65 be rejected if a survey of 490 homes in Omaha yields 336 with one or more lawn mowers? Use $\alpha = 0.05$. 6) _____
- $H_0: p = 0.65$. $H_a: p > 0.65$. Test statistic: $z = 1.66$. P-value: $p = 0.0485$.
- State your conclusion in terms of H_0 .
- A) Do not reject H_0 since the P-value is less than α .
 - B) Since the P-value is less than α , we are unable to conclude that the proportion of households in Omaha that own one or more lawn mowers is greater than 0.65.
 - C) Do not reject H_a since the P-value is less than α .
 - D) Reject H_a since the P-value is less than α .
 - E) Reject H_0 since the P-value is less than α .

Provide an appropriate response.

- 7) The county health department has concerns about the chlorine level of 0.4% mg/mL at a local water park increasing to an unsafe level. The water department tests the hypothesis that the local water park's chlorine proportions have remained the same, and obtains a P-value of 0.005. Provide an appropriate conclusion. 7) _____
- A) If the chlorine level has not changed, the probability of observing a sample chlorine level as high or higher as that observed in the sample is 0.005. We are unable to conclude that the chlorine level has increased.
 - B) The probability that the chlorine level has increased is 0.005. We are therefore unable to conclude that the chlorine level has increased.
 - C) If the chlorine level has not changed, the probability of observing a sample chlorine level as high or higher as that observed in the sample is 0.005. We conclude that the chlorine level has increased.
 - D) If the chlorine level has increased, the probability of observing a sample chlorine level of 0.4% is 0.005. We conclude that the chlorine level has increased.
 - E) The probability that the chlorine level has increased is 0.995. We conclude that the chlorine level has increased.

Assume that a simple random sample has been selected from a normally distributed population. Find the test statistic t.

- 8) Test the claim that for the adult population of a certain town, the mean annual salary is given by $\mu = \$30,000$. Sample data are summarized as $n = 17$, $\bar{x} = \$22,298$, and $s = \$14,200$. Use a significance level of $\alpha = 0.05$. 8) _____
- Find the test statistic t.
- A) 2.24 B) -9.22 C) 1.57 D) -2.24 E) -1.57

Provide an appropriate response.

- 9) A study uses a random sample of size 15. The test statistic for testing $H_0: \mu = 12$ versus $H_a: \mu \neq 12$ is $t = -2.5$. Find the approximate P-value. 9) _____
- A) 0.025
 - B) 0.05
 - C) Cannot be determined without the sample standard deviation.
 - D) 0.99
 - E) 0.013

Assume that a simple random sample has been selected from a normally distributed population. State the final conclusion.

- 10) Test the claim that the mean age of the prison population at a certain facility is less than 26 years. 10) _____
- Sample data are summarized as $n = 25$, $\bar{x} = 24.4$ years, and $s = 9.2$ years. Use a significance level of $\alpha = 0.05$.
- $H_0: \mu = 26$ $H_a: \mu < 26$
- State your conclusion about H_0 .
- A) $z = -2.69$, reject H_0
 - B) $t = 0.87$, do not reject H_0
 - C) $t = -0.87$, do not reject H_0 .
 - D) $t = -2.69$, reject H_0
 - E) $t = 12.9$, reject H_0

Classify the significance test as two-tailed, left-tailed, or right-tailed.

- 11) The manufacturer of a refrigerator system for beer kegs produces refrigerators that are supposed to maintain a true mean temperature, μ , of 46°F, ideal for a certain type of pilsner. The owner of the brewery does not agree with the refrigerator manufacturer, and will conduct a significance test to determine whether the true mean temperature differs from this value. 11) _____
- A) Left-tailed
 - B) Two-tailed
 - C) Right-tailed
 - D) None of these
 - E) Middle-tailed

Select the most appropriate answer.

- 12) If an agronomist wishes to determine whether there is evidence that the average number of bales of cotton produced in a certain county exceeds 500, 12) _____
- A) a left-tailed test should be used.
 - B) a right-tailed test should be used.
 - C) a two-tailed test should be used.
 - D) more information is necessary to determine what type of test should be used
 - E) either a one-sided or a two-sided test could be used with equivalent results

For the given significance test, explain the meaning of a Type I error, a Type II error, or a correct decision as specified.

- 13) In the past, the mean lifetime of a certain type of radio battery has been 9.8 hours. The manufacturer has introduced a change in the production method and wants to perform a significance test to determine whether the mean lifetime has increased as a result. The hypotheses are: 13) _____

$$H_0: \mu = 9.8 \text{ hours}$$

$$H_a: \mu > 9.8 \text{ hours}$$

Explain the meaning of a Type I error.

- A) Concluding that $\mu > 9.8$ hours when in fact $\mu > 9.8$ hours
- B) Concluding that $\mu > 9.8$ hours when in fact $\mu = 9.8$ hours
- C) Concluding that $\mu = 9.8$ hours when in fact $\mu < 9.8$ hours
- D) Concluding that $\mu = 9.8$ hours when in fact $\mu > 9.8$ hours
- E) Concluding that $\mu < 9.8$ hours when in fact $\mu > 9.8$ hours

Classify the conclusion of the significance test as a Type I error, a Type II error, or No error.

- 14) In 1990, the average duration of long-distance telephone calls originating in one town was 9.4 minutes. A long-distance telephone company wants to perform a significance test to determine whether the average duration of long-distance phone calls has changed from the 1990 mean of 9.4 minutes. The hypotheses are: 14) _____

$$H_0: \mu = 9.4 \text{ minutes}$$

$$H_a: \mu \neq 9.4 \text{ minutes}$$

Suppose that the results of the sample lead to nonrejection of the null hypothesis. Classify that conclusion as a Type I error, a Type II error, or a correct decision, if in fact the mean duration of long-distance phone calls has changed from the 1990 mean of 9.4 minutes.

- A) Type I error
- B) No error
- C) Type II error