

Practice 8. Broward College.

Express the null hypothesis and the alternative hypothesis in symbolic form. Use the correct symbol (μ , p , σ) for the indicated parameter.

- 1) Carter Motor Company claims that its new sedan, the Libra, will average better than 25 miles per gallon in the city. Use μ , the true average mileage of the Libra. 1) _____
 A) $H_0: \mu = 25$ B) $H_0: \mu > 25$ C) $H_0: \mu = 25$ D) $H_0: \mu < 25$
 $H_1: \mu > 25$ $H_1: \mu \leq 25$ $H_1: \mu < 25$ $H_1: \mu \geq 25$
- 2) The owner of a football team claims that the average attendance at games is over 63,500, and he is therefore justified in moving the team to a city with a larger stadium. 2) _____
 A) $H_0: \mu < 63,500$ B) $H_0: \mu > 63,500$ C) $H_0: \mu = 63,500$ D) $H_0: \mu = 63,500$
 $H_1: \mu \geq 63,500$ $H_1: \mu \leq 63,500$ $H_1: \mu > 63,500$ $H_1: \mu < 63,500$
- 3) A psychologist claims that more than 3.2 percent of the population suffers from professional problems due to extreme shyness. Use p , the true percentage of the population that suffers from extreme shyness. 3) _____
 A) $H_0: p = 3.2\%$ B) $H_0: p < 3.2\%$ C) $H_0: p > 3.2\%$ D) $H_0: p = 3.2\%$
 $H_1: p < 3.2\%$ $H_1: p \geq 3.2\%$ $H_1: p \leq 3.2\%$ $H_1: p > 3.2\%$

Assume that the data has a normal distribution and the number of observations is greater than fifty. Find the critical z value used to test a null hypothesis.

- 4) $\alpha = 0.05$ for a two-tailed test. 4) _____
 A) ± 1.764 B) ± 1.96 C) ± 2.575 D) ± 1.645
- 5) $\alpha = 0.09$ for a right-tailed test. 5) _____
 A) 1.96 B) ± 1.96 C) 1.34 D) ± 1.34
- 6) $\alpha = 0.05$ for a left-tailed test. 6) _____
 A) ± 1.96 B) ± 1.645 C) -1.96 D) -1.645

Find the value of the test statistic z:

- 7) The claim is that the proportion of drowning deaths of children attributable to beaches is more than 0.25, and the sample statistics include $n = 575$ drowning deaths of children with 30% of them attributable to beaches. 7) _____
 A) 2.62 B) -2.77 C) 2.77 D) -2.62
- 8) The claim is that the proportion of accidental deaths of the elderly attributable to residential falls is more than 0.10, and the sample statistics include $n = 800$ deaths of the elderly with 15% of them attributable to residential falls. 8) _____
 A) -4.71 B) 4.71 C) 3.96 D) -3.96

Formulate the indicated conclusion in nontechnical terms. Be sure to address the original claim.

- 9) An entomologist writes an article in a scientific journal which claims that fewer than 17 in ten thousand male fireflies are unable to produce light due to a genetic mutation. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is to reject the null hypothesis, state the conclusion in nontechnical terms. 9) _____
- A) There is not sufficient evidence to support the claim that the true proportion is less than 17 in ten thousand.
 - B) There is not sufficient evidence to support the claim that the true proportion is greater than 17 in ten thousand.
 - C) There is sufficient evidence to support the claim that the true proportion is greater than 17 in ten thousand.
 - D) There is sufficient evidence to support the claim that the true proportion is less than 17 in ten thousand.
- 10) Carter Motor Company claims that its new sedan, the Libra, will average better than 30 miles per gallon in the city. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is to reject the null hypothesis, state the conclusion in nontechnical terms. 10) _____
- A) There is not sufficient evidence to support the claim that the mean is greater than 30 miles per gallon.
 - B) There is sufficient evidence to support the claim that the mean is less than 30 miles per gallon.
 - C) There is sufficient evidence to support the claim that the mean is greater than 30 miles per gallon.
 - D) There is not sufficient evidence to support the claim that the mean is less than 30 miles per gallon.
- 11) The owner of a football team claims that the average attendance at games is over 561, and he is therefore justified in moving the team to a city with a larger stadium. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is failure to reject the null hypothesis, state the conclusion in nontechnical terms. 11) _____
- A) There is not sufficient evidence to support the claim that the mean attendance is less than 561.
 - B) There is sufficient evidence to support the claim that the mean attendance is greater than 561.
 - C) There is sufficient evidence to support the claim that the mean attendance is less than 561.
 - D) There is not sufficient evidence to support the claim that the mean attendance is greater than 561.
- 12) A psychologist claims that more than 24 percent of the population suffers from professional problems due to extreme shyness. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is failure to reject the null hypothesis, state the conclusion in nontechnical terms. 12) _____
- A) There is sufficient evidence to support the claim that the true proportion is less than 24 percent.
 - B) There is sufficient evidence to support the claim that the true proportion is greater than 24 percent.
 - C) There is not sufficient evidence to support the claim that the true proportion is less than 24 percent.
 - D) There is not sufficient evidence to support the claim that the true proportion is greater than 24 percent.

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

- 13) A medical researcher claims that 12% of children suffer from a certain disorder. Identify the type I error for the test. 13) _____
- A) Reject the claim that the percentage of children who suffer from the disorder is equal to 12% when that percentage is actually 12%.
 - B) Reject the claim that the percentage of children who suffer from the disorder is different from 12% when that percentage really is different from 12%.
 - C) Fail to reject the claim that the percentage of children who suffer from the disorder is equal to 12% when that percentage is actually 12%.
 - D) Fail to reject the claim that the percentage of children who suffer from the disorder is equal to 12% when that percentage is actually different from 12%.
- 14) The principal of a school claims that the percentage of students at his school that come from single-parent homes is 16%. Identify the type II error for the test. 14) _____
- A) Reject the claim that the percentage of students that come from single-parent homes is equal to 16% when that percentage is actually less than 16%.
 - B) Fail to reject the claim that the percentage of students that come from single-parent homes is equal to 16% when that percentage is actually 16%.
 - C) Fail to reject the claim that the percentage of students that come from single-parent homes is equal to 16% when that percentage is actually different from 16%.
 - D) Reject the claim that the percentage of students that come from single-parent homes is equal to 16% when that percentage is actually 16%.

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

- 15) A manufacturer considers his production process to be out of control when defects exceed 3%. In a random sample of 85 items, the defect rate is 5.9% but the manager claims that this is only a sample fluctuation and production is not really out of control. At the 0.01 level of significance, test the manager's claim. 15) _____
- 16) A supplier of digital memory cards claims that no more than 1% of the cards are defective. In a random sample of 600 memory cards, it is found that 3% are defective, but the supplier claims that this is only a sample fluctuation. At the 0.01 level of significance, test the supplier's claim that no more than 1% are defective. 16) _____
- 17) A poll of 1068 adult Americans reveals that 48% of the voters surveyed prefer the Democratic candidate for the presidency. At the 0.05 level of significance, test the claim that at least half of all voters prefer the Democrat. 17) _____

Assume that a simple random sample has been selected from a normally distributed population and test the given claim. Use either the traditional method or P-value method as indicated. Identify the null and alternative hypotheses, test statistic, critical value(s) or P-value (or range of P-values) as appropriate, and state the final conclusion that addresses the original claim.

- 18) Use a significance level of $\alpha = 0.05$ to test the claim that $\mu = 32.6$. The sample data consist of 15 scores for which $\bar{x} = 41.6$ and $s = 8$. Use the traditional method of testing hypotheses. 18) _____
- 19) Use a significance level of $\alpha = 0.01$ to test the claim that $\mu > 2.85$. The sample data consist of 9 scores for which $\bar{x} = 3.19$ and $s = 0.55$. Use the traditional method of testing hypotheses. 19) _____

20) A test of sobriety involves measuring the subject's motor skills. Twenty randomly selected sober subjects take the test and produce a mean score of 41.0 with a standard deviation of 3.7. At the 0.01 level of significance, test the claim that the true mean score for all sober subjects is equal to 35.0. Use the traditional method of testing hypotheses. 20) _____

21) In tests of a computer component, it is found that the mean time between failures is 520 hours. A modification is made which is supposed to increase the time between failures. Tests on a random sample of 10 modified components resulted in the following times (in hours) between failures. 21) _____
518 548 561 523 536
499 538 557 528 563

At the 0.05 significance level, test the claim that for the modified components, the mean time between failures is greater than 520 hours. Use the P-value method of testing hypotheses.

22) A cereal company claims that the mean weight of the cereal in its packets is 14 oz. The weights (in ounces) of the cereal in a random sample of 8 of its cereal packets are listed below. 22) _____
14.6 13.8 14.1 13.7 14.0 14.4 13.6 14.2
Test the claim at the 0.01 significance level.

Assume that a simple random sample has been selected from a normally distributed population. Find the test statistic, P-value, critical value(s), and state the final conclusion.

23) Test the claim that for the population of female college students, the mean weight is given by $\mu = 132$ lb. Sample data are summarized as $n = 20$, $\bar{x} = 137$ lb, and $s = 14.2$ lb. Use a significance level of $\alpha = 0.1$. 23) _____

24) Test the claim that for the adult population of one 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 $\alpha = 0.05$. 24) _____

25) Test the claim that the mean lifetime of car engines of a particular type is greater than 220,000 miles. Sample data are summarized as $n = 23$, $\bar{x} = 226,450$ miles, and $s = 11,500$ miles. Use a significance level of $\alpha = 0.01$. 25) _____

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

26) Various temperature measurements are recorded at different times for a particular city. The mean of 20°C is obtained for 60 temperatures on 60 different days. Assuming that $\sigma = 1.5^\circ\text{C}$, test the claim that the population mean is 22°C. Use a 0.05 significance level. 26) _____