

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

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

- 1) An entomologist writes an article in a scientific journal which claims that fewer than 14 in ten thousand male fireflies are unable to produce light due to a genetic mutation. Use the parameter p , the true proportion of fireflies unable to produce light. 1) _____

A) $H_0: p < 0.0014$ B) $H_0: p = 0.0014$ C) $H_0: p = 0.0014$ D) $H_0: p > 0.0014$
H₁: $p \geq 0.0014$ H₁: $p < 0.0014$ H₁: $p > 0.0014$ H₁: $p \leq 0.0014$

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.

- 2) $\alpha = 0.05$ for a two-tailed test. 2) _____

A) ± 1.764 B) ± 2.575 C) ± 1.645 D) ± 1.96

- 3) $\alpha = 0.09$ for a right-tailed test. 3) _____

A) 1.96 B) ± 1.34 C) 1.34 D) ± 1.96

- 4) $\alpha = 0.05$ for a left-tailed test. 4) _____

A) -1.96 B) -1.645 C) ± 1.96 D) ± 1.645

Use the given information to find the P-value. Also, use a 0.05 significance level and state the conclusion about the null hypothesis (reject the null hypothesis or fail to reject the null hypothesis).

- 5) The test statistic in a right-tailed test is $z = 0.52$. 5) _____

A) 0.0195; reject the null hypothesis B) 0.6030; fail to reject the null hypothesis
C) 0.3015; reject the null hypothesis D) 0.3015; fail to reject the null hypothesis

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

- 6) An entomologist writes an article in a scientific journal which claims that fewer than 4 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. 6) _____

A) There is not sufficient evidence to support the claim that the true proportion is less than 4 in ten thousand.
B) There is sufficient evidence to support the claim that the true proportion is greater than 4 in ten thousand.
C) There is sufficient evidence to support the claim that the true proportion is less than 4 in ten thousand.
D) There is not sufficient evidence to support the claim that the true proportion is greater than 4 in ten thousand.

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

7) A psychologist claims that more than 7.1% of adults suffer from extreme shyness. Identify the type II error for the test. 7) _____

- A) Fail to reject the statement that the percentage of adults who suffer from extreme shyness is less than or equal to 7.1% when that percentage is actually greater than 7.1%.
- B) Reject the statement that the percentage of adults who suffer from extreme shyness is less than or equal to 7.1% when that percentage is actually 7.1%.
- C) Reject the statement that the percentage of adults who suffer from extreme shyness is less than or equal to 7.1% when that percentage is actually greater than 7.1%.
- D) Fail to reject the claim that the percentage of adults who suffer from extreme shyness is greater than or equal to 7.1% when that percentage is actually less than 7.1%.

8) A skeptical paranormal researcher claims that the proportion of Americans that have seen a UFO is less than 4 in a thousand. Identify the type I error for the test. 8) _____

- A) Reject the statement that the proportion of Americans that have seen a UFO is greater than or equal to 4 in a thousand when that proportion is actually less than 4 in a thousand.
- B) Reject the claim that the proportion of Americans that have seen a UFO is less than or equal to 4 in a thousand when that proportion is actually less than 4 in a thousand.
- C) Fail to reject the statement that the proportion of Americans that have seen a UFO greater than is equal to 4 in a thousand when that proportion is actually 4 in a thousand.

BINOMIAL PROPORTION HYPOTHESIS TESTING. Test the claims given below in questions 9--12. Label and show all 5 steps of the hypothesis testing algorithm for each question on separate paper. Show the work for both the Critical Value (CV) and P-value Methods of decision making when doing Step 4 of the algorithm. There is no need to fill in the answer blanks that appear below, just right of each question. You will be graded on the work you turn in on separate paper.

9) 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. 9) _____

10) According to a recent poll 53% of Americans would vote for the incumbent president. If a random sample of 100 people results in 45% who would vote for the incumbent, test the claim that the actual percentage is 53%. Use a 0.10 significance level. 10) _____

11) In a survey, 1864 out of 2246 randomly selected adults in the United States said that texting while driving should be illegal. Use a 5% level of significance to test the claim that more than 80% of adults believe that texting while driving should be illegal. 11) _____

12) In a presidential election, 308 out of 611 voters surveyed said that they voted for the candidate who won. Use a 0.01 significance level to test the claim that among all voters, the percentage who believe that they voted for the winning candidate is equal to 43%. 12) _____