

Honors Statistics

7.2 Review

State the null and alternative hypothesis.

1. The mean annual income of teachers is less than \$46,000.
2. The percentage of students with a GPA more than 3.5 is 27.2%.
3. The mean IQ of statistics students is 110.

A person has a blood test to determine if they have a certain illness.

4. Identify the null and alternative hypotheses.
6. What is the Type I error?
7. What is the Type II error?
8. In your opinion, which error is more harmful for this situation? Explain.

Compute the critical value for each stated value of alpha.

9. Right tail test, $\alpha = .01$
10. Left tail test, $\alpha = .08$
11. Two tail test, $\alpha = .02$

For the given test statistic and the given critical value, determine if you would reject the null hypothesis, or fail to reject the null hypothesis. Include a sketch for each question.

12. Left tail test, test statistic = -1.35, critical value = -2.10
13. Right tail test, test statistic = 1.45, critical value = 1.32
14. Left tail test, test statistic = -.78, critical value = -1.02
15. Both tail test, test statistic = 1.82, critical values = ± 1.78

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Answers

1. $H_0 : \mu = \$46,000$
 $H_a : \mu < \$46,000$
2. $H_0 : p = .272$
 $H_a : p > .272$
3. $H_0 : \mu = 110$
 $H_a : \mu \neq 110$
4. null: the person is healthy (does not have the illness)
alternative: the person is not healthy (has the illness)
5. The test indicates the person has the illness but they actually don't have the illness.
6. The test indicates the person does not have the illness but they actually do have the illness.
7. Type 1: the person is treated for an illness they don't have OR
Type 2: the person is not being treated for the illness but should have treatment
8. Answers will vary
9. $z_{cv} = 2.326$
10. $z_{cv} = -1.405$
11. $z_{cv} = \pm 2.326$
12. fail to reject null; test statistic is in the rejection region
13. reject null; test statistic is in the rejection region
14. fail to reject null; test statistic not in the rejection region
15. reject null; test statistic is in the rejection region
15. fail to reject null; test statistic is not in the rejection region