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Chapter 8 Homework



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1. Define hypothesis testing.
2. True or False. Hypothesis testing can also be referred to as tests of significance.
3. Define level of significance.
4. Define test statistic.
5. Define critical value.
6. Define p-value.
7. True or False. Small p-values provide evidence against the null hypothesis.
8. True or False. The critical value approach or the p-value approach can be used for a hypothesis test. The preference depends on the researcher.
9. True or False. If the test statistic falls in the rejection region, then the null hypothesis cannot be rejected.
10. True or False. Left- and right-tailed tests can also be considered two-tailed tests.
11. Fill in the blank. A _____ is made in regards to rejecting or not rejecting the null hypothesis.
12. Fill in the blank. The _____ is a summary statement of the results.
13. Fill in the blank. Type _____ error is an error that occurs when the null hypothesis is rejected when in fact it is true.
14. Fill in the blank. Type II error (β) is an error that occurs when the _____ hypothesis is not rejected when in fact it is false.
15. Staff members at a marketing firm claim that the average annual salary of the firm's staff is less than the state's average annual salary, which is \$35,000. To test this claim, a random sample of 30 of the firm's staff members is analyzed. The mean annual salary is \$32,450. Assume the population standard deviation is \$4700. At the 5% level of significance, test the staff's claim.



16. Test at $\alpha = 0.10$ and state the decision.

$$H_0: \mu = 250$$

$$H_A: \mu > 250$$

$$\bar{x} = 282$$

$$\sigma = 19$$

$$n = 44$$

17. Millions of households use fluorescent light bulbs each year. A certain brand of light bulb has a mean life of 1000 hours. A manufacturer claims that its new brand of bulbs has a mean life of more than 1000 hours. Twenty bulbs are tested, which results in a mean of 1075 hours with a standard deviation of 150 hours. Perform a test of hypothesis at the 1% level of significance. Assume the sample was taken from a normal population.
18. Assuming the sample was taken from a normal population, test at $\alpha = 0.05$ and state the decision.

$$H_0: \mu = 13$$

$$H_A: \mu < 13$$

$$\bar{x} = 10$$

$$s = 0.7$$

$$n = 9$$

19. Flooding is not uncommon in Florida. An article in the local newspaper reported that 52% of Florida homeowners have flood insurance. Researchers at a research organization wanted to examine this claim. They believed the percentage was different than what was reported in the newspaper. They decided to survey 500 homeowners and found that 233 of them had flood insurance. Conduct a test at $\alpha = 0.10$.



20. Test at $\alpha = 0.01$ and state the decision.

$$H_0: p = 0.75$$

$$H_A: p \neq 0.75$$

$$x = 306$$

$$n = 400$$

21. What type of test should be performed to test the following?

$$H_0: \mu = 27$$

$$H_A: \mu < 27$$

$$\bar{x} = 33$$

$$\sigma = 2.5$$

$$n = 77$$

22. Assuming the sample was taken from a normal population, what type of test should be performed to test the following?

$$H_0: \mu = 190$$

$$H_A: \mu > 190$$

$$\bar{x} = 186$$

$$s = 22$$

$$n = 14$$

23. Based on the following, should a one-tailed or two-tailed test be used?

$$H_0: \mu = 17,500$$

$$H_A: \mu \neq 17,500$$

$$\bar{x} = 18,000$$

$$s = 3000$$

$$n = 10$$



24. Based on the following, should a one-tailed or two-tailed test be used?

$$H_0: \mu = 91$$

$$H_A: \mu > 91$$

$$\bar{x} = 88$$

$$s = 12$$

$$n = 15$$

25. True or False. If the p-value is less than or equal to the level of significance, then the null hypothesis can be rejected.



Answers

1. Hypothesis Testing: a procedure that uses sample data to test whether a hypothesis about the value of a population parameter is true.
2. True
3. Level of Significance: the probability of rejecting the null hypothesis when it is true.
4. Test Statistic: a numerical summary calculated from sample data. The test statistic can vary based on the population parameter being tested as well as the sampling distribution.
5. Critical Value: a value created based on the level of significance and type of test (e.g. left-tailed test, right-tailed test, two-tailed test). The value is used as the boundary for the rejection region.
6. P-value: the probability of observing the test statistic as extreme or more extreme as the one observed from the sample data, assuming the null hypothesis is true.
7. True
8. True
9. False
10. False
11. Decision
12. Conclusion
13. I
14. Null
15. $H_0: \mu = 35,000$, $H_A: \mu < 35,000$. $z = -2.97$. Reject the null hypothesis. There is sufficient evidence to suggest that the average annual salary of the staff at a marketing firm is less than the state's average annual salary.
16. Reject the null hypothesis
17. $H_0: \mu = 1000$, $H_A: \mu > 1000$. $t = 2.24$. Do not reject the null hypothesis. There is not sufficient evidence to suggest that the new brand of light bulbs has a mean life of more than 1000 hours.
18. Reject the null hypothesis



19. $H_0: p = 0.52$, $H_A: p \neq 0.52$. $z = -2.42$. Reject the null hypothesis. There is sufficient evidence to suggest that the proportion of Florida homeowners who have flood insurance is different from 52%.
20. Do not reject the null hypothesis
21. Z-test
22. T-test
23. Two-tailed test
24. One-tailed test
25. True

