

UNIVERSITY OF TEXAS AT AUSTIN

Problem Set # 10

Hypothesis testing. p -value.

Problem 10.1. The null hypothesis is a statement about the population parameter. *True or false?*

Solution: TRUE

Problem 10.2. The null and alternative hypotheses are stated in terms of the statistics obtained from the random sample. *True or false?*

Solution: FALSE

Complete the following statements:

Problem 10.3. When we state the alternative hypothesis to look for a difference in a parameter in any direction, we are doing a _____-sided test.

Solution: ...two ...

Problem 10.4. When choosing between a one-sided alternative hypothesis and a two-sided alternative hypothesis, you should base the decision on _____.

Solution: the (research) question you are trying to answer.

Problem 10.5. The _____ the p -value, the **stronger** the evidence against the null hypothesis provided by the data.

Solution: ...smaller ...

Provide your complete solution for the following problems.

Problem 10.6. The square footage of several thousand apartments in a new development is advertised to be 1250 square feet, on average. A tenant group thinks that the apartments are smaller than advertised. They hire an engineer to measure a sample of apartments to test their suspicions. Let μ represent the “true” mean area (in square feet) of these apartments. What are the appropriate null and alternative hypotheses?

Solution: $H_0 : \mu = 1250$ vs. $H_a : \mu < 1250$

Problem 10.7. Is the mean height for all adult American males between the ages of 18 and 21 now over 6 feet? Let μ denote the population mean height of all adult American males between the ages of 18 and 21. What are the appropriate null and alternative hypotheses?

Solution: $H_0 : \mu = 6$ vs. $H_a : \mu > 6$

Problem 10.8. The hypotheses are $H_0 : \mu = 10$ versus $H_a : \mu > 10$. The value of the test statistic for the population mean is $z = -2.12$. What is the corresponding p -value?

Solution: $\mathbb{P}[Z \geq -2.12] = 1 - \Phi(-2.12) = 0.983$

Problem 10.9. The value of the test statistic for a two-sided test for a population mean is $z = -2.12$. What is the corresponding p -value?

Solution: $2\mathbb{P}[Z \leq -2.12] = 2\Phi(-2.12) = 0.0340$