

9.4 Rare Events, the Sample, Decision and Conclusion

Section 9.4 Rare Events, the Sample, Decision and Conclusion

Learning Objective:

In this section, you will:

- Understand the general concept and use the terminology of hypothesis testing
- Interpret real-world problems and apply the five-step process of hypothesis testing to make statistical conclusions

Rare Event Rule: If under a given assumption, the probability of an event is extremely small, we conclude that the assumption was not correct.

P-value is the probability that an event will happen purely by chance assuming the null hypothesis is true. The smaller the p-value, the stronger the evidence is against the null hypothesis.

A systematic way to make a decision of whether to reject or not reject the null hypothesis is to compare the p-value and a preset or preconceived α , **significance level**.

Decision

- If the p-value is low, the null must go.
- If the p-value is high, the null must fly. Or
- If P-value is less than α , Reject H_0
- If P-value is greater than α , Fail to reject H_0

Example 1: Find the **p-value** for each test, and state the conclusion about the null hypothesis Note 1. $H_1: p > \frac{1}{4}$, test statistic is $z = 2.79$, $\alpha = 0.01$

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2. Two-tailed test, test statistic is $z = 1.75$, $\alpha = 0.05$

Conclusion: After you make your decision, write a thoughtful conclusion about the hypotheses in terms of the given problem.

Example 2: If the original claim is that the percentage of Americans who know their credit score is less than 20%, and our hypothesis test tells us to reject the null hypothesis, the final conclusion is:

Example 3: Original claim: The percentage of nonsmokers exposed to secondhand smoke is 41%. The decision is to fail to reject the null. State the final conclusion.

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Example 4: Original claim: The mean GPA of LMC students is higher than 3.1. The decision is to fail to reject the null hypothesis. State the final conclusion.

For more information and examples see online textbook OpenStax Introductory Statistics pages 511-514.

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