

Are there any questions on the HW problems for Chapters 18 & 19? Quiz is Thursday.

Chapter 20 Testing Hypotheses About Proportions

A basketball player claims to make 80% of his free throws. To test his claim, you ask him to take 20 free throws. He does and only makes 8 out of 20 baskets (.4). Do you believe his claim?

You either **accept or reject** the claim by reasoning whether or not the outcome is likely to happen by chance if the original claim is true. This is **significance testing**.

A **test of significance** is a formal procedure for comparing observed data with a hypothesis whose truth we want to access.

The **hypothesis** is a statement about a population parameter (either a proportion or a mean).

The results of a significance test are expressed as a probability (called a **p-value**). The **p-value** is the probability that we would obtain our observed results if the given claim were true. (a conditional probability)

The statement being tested in a test of significance is called the **null hypothesis, H_0** (H-naught).

The test of significance assesses the strength of the evidence against the null hypothesis, H_0 (H-naught).

The **alternative hypothesis, H_a** , is the claim that we are trying to find evidence to support.

The probability computed assuming the H_0 is true, that the observed outcome would take a value as extreme or more extreme than that actually observed is called the **p-value** of the test. (The p-value is a conditional probability.)

Small p-values are evidence against H_0 because they say that the observed outcome is unlikely to occur by chance. Large p-values fail to give evidence against H_0 .

A result with a small p-value (The rule of thumb is less than .05) is called **statistically significant** and provides evidence against H_0 .

Steps for a Significance Test:

1. State the null hypothesis, H_0 , in terms of a population parameter.
2. State the alternative hypothesis, H_a .
3. Use the data to calculate a statistic that estimates the parameter.
4. Calculate the p-value to decide to either accept or reject H_0 .

First let's practice writing the null hypothesis, H_0 , and the alternative hypothesis, H_a , for some tests of significance.

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2. More hypotheses.

a) H_0 : The proportion of high school graduates is 40%. ($p = 0.40$) H_a : The proportion of high school graduates is not 40%. ($p \neq 0.40$)

b) H_0 : The proportion of cars needing transmission repair is 20%. ($p = 0.20$) H_a : The proportion of cars needing transmission repair is less than 20%. ($p < 0.20$)

c) H_0 : The proportion of people who like the flavor is 60%. ($p = 0.60$) H_a : The proportion of people who like the flavor is greater than 60%. ($p > 0.60$)

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