

Math 146 8.2 - TESTING A CLAIM ABOUT A PROPORTION

NOTATION

n = sample size

$\hat{p} = \frac{x}{n}$ this is the sample proportion

x = number of "success"

p = the population proportion

significance level is determined by choosing an α prior to conducting the procedure.

REQUIREMENTS

1. The sample observations are a simple random sample
2. The conditions of the binomial distribution are satisfied.
3. The conditions $np \geq 5$ and $nq \geq 5$ are satisfied. (This ensures that the binomial distribution can be approximated by a normal distribution with $\mu = np$ and $\sigma = \sqrt{npq}$.)

The **Test Statistic** for testing a claim about a population proportion is:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} \quad \text{The P-value can be computed by your calculator or using the standard normal distribution.}$$

Example 1 A TNS poll of 1000 randomly selected adults showed that 460 of them say that public speaking is an activity they dread most. Test the claim that fewer than half of adults say that public speaking is the activity they dread most at the 0.05 significance level.

- (1) Write down the pertinent information given in the problem and calculate the sample proportion.
 - (2) Determine if it's two-tailed, left-tail, right-tail.
 - (3) State the null hypothesis and alternative hypothesis.
 - (4) Draw a normal curve indication indicating the critical point.
 - (5) Calculate the critical point.
 - (6) Calculate the test statistic.
 - (7) Give a statement of either "reject H_0 " or "fail to reject H_0 " based on the test statistic.
 - (8) Calculate the P-value.
 - (9) Write a statement of the conclusion in nontechnical terms.
 - (10) Calculate the hypothesis test on the TI84 using **1-PropZTest**, or EasyCalc Hypothesis Test for a Single Proportion.
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Example 2 In a Gallup poll of 1003 randomly selected subjects, 373 said that they have a gun in their home. Test the claim that 35% of homes have guns in them at the 0.05 significance level.

EXAMPLE 3 The Pew Research Center conducted a survey of 1007 adults and found that 856 of them know what Twitter is. Use a 0.01 significance level to test the claim that more than 75% of adults know what Twitter is.

There are three kinds of lies: Lies, Damn Lies, and Statistics.

Mark Twain