Fact Sheet – One Proportion Tests

Step 1: The null hypothesis (H_0) is always of the form p = #. For the alternative hypothesis (H_1), we also compare p to the same number, using one of these signs: <, >, $\neq$. Use the wording in the claim to determine the sign for H_1.

Step 2: The level of significance, α, sets the benchmark between sufficient evidence and insufficient evidence. The more important the hypothesis test, the lower the level of significance should be. For our problems, simply read the level of significance from the problem.

Step 3: So far, the only test we know is the one proportion test. We use that when we compare the proportion of a single population to a particular percentage. The sample data will be of the form x out of n. The sample data will be qualitative or categorical in nature.

Step 4: The test statistic is a formula for determining how many standard errors the sample proportion $\hat{p}$ is from the claimed population proportion p_0.

The test statistic for the one proportion test is $z = \dfrac{\hat{p} - p_0}{\sqrt{\dfrac{p_0(1-p_0)}{n}}}$.

The p-value is the probability of obtaining a sample proportion as extreme as, or more extreme than, the sample proportion $\hat{p}$ if the null hypothesis is true. For a left tail test, we find the area under the z curve to the left of the test statistic. For a right tail test, we find the area to the right. For a two tail test we find the area in one tail and double it.

Both of these (test statistic and p-value) can be computed using StatCrunch.

Stat > Proportions > One sample > with summary

Enter the number of successes (x) and number of observations (n) on the first screen.

Enter the value from the null hypothesis and the sign for the alternative hypothesis on the second screen.

Step 5: If the p-value is less than α, reject H_0. This means that there is sufficient evidence to conclude that "H_1 is true". (You must write out "H_1 is true" in terms of the actual problem.)

If the p-value is **NOT** less than α, **fail to reject** H_0. This means that there **is NOT** sufficient evidence to conclude that "H_1 is true". (You must write out "H_1 is true" in terms of the actual problem.)

Conditions: Before beginning the test, you must verify that the following conditions are met.

- The sample is independently obtained using simple random sampling or through a randomized experiment.
- $n\hat{p}(1-\hat{p}) \geq 10$
- $n \leq 5\%$ of N or $20n \leq N$

1) The drug Lipitor is meant to reduce total cholesterol and LDL cholesterol. In clinical trials, 19 out of 863 patients taking 10 mg of Lipitor daily complained of flulike symptoms.
Suppose that it is known that 1.9% of patients taking competing drugs complain of flulike symptoms.
Is there evidence to conclude that more than 1.9% of Lipitor users experience flulike symptoms as a side effect at the $\alpha = 0.01$ level of significance?

2) In 1994, 52% of parents of children in high school felt it was a serious problem that high school students were not being taught enough math and science.
A recent survey found that 256 of 800 parents of children in high school felt it was a serious problem that high school students were not being taught enough math and science.
Do parents feel differently today than they did in 1994? Use the $\alpha = 0.05$ level of significance.

3) In December 2001, 38% of adults with children under the age of 18 reported that their family ate dinner together 7 nights a week.
In a recent poll, 403 of 1122 adults with children under the age of 18 reported that their family ate dinner together 7 nights a week.
Has the proportion of families with children under the age of 18 who eat dinner together 7 nights a week decreased? Use the $\alpha = 0.05$ significance level.