Identifying the Claim and Setting up Hypothesis for μ or π
STA 2023 & 2122

The first thing needed to know is that there are two Hypotheses called the Null Hypothesis (H_0) and the Alternative Hypothesis (H_1); they are mutually exclusive.

There is also a claim, which is something that can be said or inferred to the Population Proportion or the Population Mean. This claim can be that the proportion has increased, decreased, stay the same, or it has changed. According to the words used in the problem, the claim will be with the Null Hypothesis (H_0) or Alternative Hypothesis (H_1).

Alternative Hypothesis Symbol	Alternative Hypothesis Clue words	Alternative Hypothesis Type of test	**Null Hypothesis Symbol**
$<$	Less than, decreased, faster	Left tailed Test	$\geq$
$>$	More than, increased, slower	Right tailed Test	$\leq$
$\neq$	Not equal to, has changed	Two Tailed Test	$=$

Example 1: For a shipment of cable, suppose that the specifications call for a mean breaking strength of 2010 pounds. A sample of the breaking strength of 32 segments of cable has a mean of 1895 pounds with an associated standard deviation of 59 pounds. Using the 5% level, test the significance of the difference found.

In this example, we must test the difference found. This means that the Alternative Hypothesis will have the "not equal sign." The claim will be based on the "specifications call for a mean breaking strength of 2010"

H_0: $\mu = 2010$ pounds. (This will be the claim).

H_1: $\mu \neq 2010$ pounds

Example 2: A company producing light bulbs wants to know if it can claim that the produced light bulbs last more than 900 burning hours. To answer this question, the company takes a random sample of 300 from those it has produced and finds that the average lifetime for this sample is 884 burning hours. The company knows that the standard deviation of the lifetime of light bulbs is 91 hours. Can the company claim that the average lifetime of its light bulbs is more than 900 hours, at the 5% significance level?

This example says that the company is claiming that the light bulbs last more 900 hours therefore the assumption will be "greater than" sign for the Alternative Hypothesis.

H_0: $\mu \le 900$ hours.

H_1: $\mu > 900$ hours. (This will be the claim)

Example 3: The NFL reports that the people who watch Monday night football games on television are evenly divided between men and women. Out of random sample of 500 people who regularly watch the Monday night games, 238 are men. Using a .10 level of significance, can we conclude that the report is false?

The NFL reports that the proportion is actually 50%. This can be false if the proportion is either more or less than 50%. Having this in mind the Null and Alternative Hypothesis looks like:

H_0: $\pi = .5$ (This will be the claim).

H_1: $\pi \neq .5$

Example 4: An electrical company claimed that less than 2% of the parts which they supplied on a government contract are defective. A sample of 642 parts was tested, and 17 did not meet the specifications. Can we accept the company's claim at a .05 level of significance?

They want to test the proportion of the parts that do not meet the specifications. Since the claim that the proportion is less than 2%, the symbol for the Alternative Hypothesis will be <. The opposite symbol will be used for the Null Hypothesis. Given this, the Null and Alternative Hypothesis will look like:

H_0: $\pi \ge .02$

H_1: $\pi < .02$ (This will be the claim).