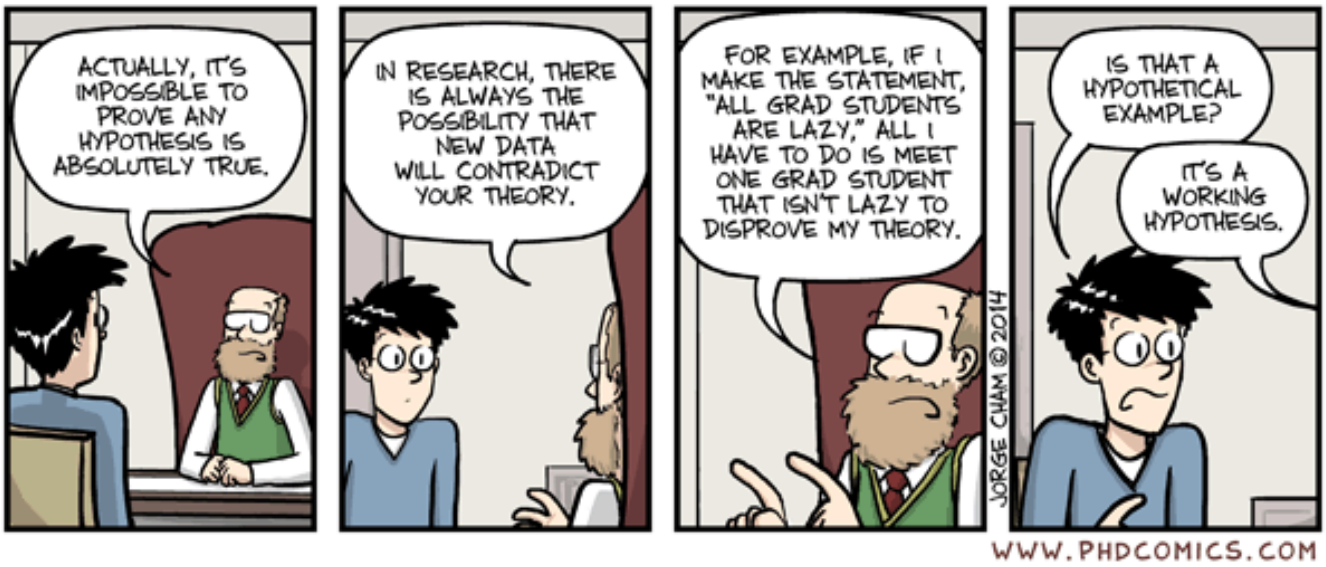

In statistics, a ***hypothesis*** is a claim or statement about a property of a <u>population</u>. This means that **population symbols will be used** (μ, σ, and p). Yes, all hypothesis tests are written in greek.

Step 1: Write down what's given

i.e. sample standard deviation, sample size, population proportion

Step 2: Figure out what table & formula you should use

For now we will only use the Z formula, but in the *real world* there are several options.

Step 3: Draw the picture!

-Left tailed is less than
-Right tailed is greater than
-Two tailed is equal to or not equal to

Step 4: Use the tables to find the critical value and add it to the picture

-Use **α** to find the critical value in a one tailed test
-Use, **α/2** to find the critical value in a two tailed test
The critical value represents the probability of rejecting H_0 when H_0 is actually true.

<u>Examples</u>

Use a normal curve and determine the critical value for the following:

A) Right tail test, $\alpha = 0.05$

B) Two tail test, $\alpha = 0.05$

C) Left tail test, $\alpha = 0.05$

Step 5: Write the hypothesis

a. The null hypothesis H_0 always has an equal sign =. It represents the previously assumed value.
b. The alternative hypothesis has either a less than sign <, greater than sign > or not equal to sign ≠ It represents a change and is usually the claim.

Examples

Claim 1: The mean age of Middlesex County College students is different from 20.8 years.

H_0 : _____

H_1 : _____

Claim 2: The mean amount of coffee dispensed by a vending machine is less than 8 ounces.

H_0 : _____

H_1 : _____

Claim 3: The mean amount of time that students require to graduate from MCC is more than 2.5 years.

H_0 : _____

H_1 : _____

Your Turn

1. The average age of disk jockeys is less than 27.6 years.

2. The average time to complete a test is more than 45 minutes.

Step 6: Use formula to find the test statistic *Z, t,* X^2 etc. Right now we will use: $z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$

Step 7: Decide whether to reject or fail to reject the null hypothesis.

-If the test statistic falls in the shaded critical region, reject H_0

-If the test statistic does NOT fall in the shaded critical region, "Fail to reject" H_0

Memory tool:
Reject Ho if the
Math is "shady"

Examples – reject or fail to reject?

1) Right tail test with critical value of z = 1.645 and test value of z = 1.72

2) Left tail test with critical value of z = -1.96 and test value of z = -1.25

3) Two tail test with critical values of z = 2.575 and -2.575; test value of z = 2.83

Step 8: State your conclusion:

	Original claim is the null hypothesis	**Original claim is alternative hypothesis**
Reject H_0 *(The Test statistic is Shady)*	**"There is sufficient evidence to warrant rejection of the claim that… (original claim)"** *This is the only time that the original claim can be rejected.*	**"The sample data supports the claim that…(original claim)"** *This is the only time that the original claim can be supported*
Fail to reject H_0	**"There is NOT sufficient evidence to warrant rejection of the claim that… (original claim)"**	**"There is NOT sufficient sample evidence to warrant rejection of the claim that…(original claim)"**

Source: Triola, M. F. (2003). *Elementary Statistics* (9th ed.), Pearson Education, Inc.

Problem 1: The manufacturer of a certain type of ATM machine reports that the mean ATM withdrawal is $60. The manager of convenience store believes that it is less than $60. He obtains a sample of 35 withdrawals and finds the sample mean is $52. Assume the population standard deviation is $13. Test the manager's claim at the 0.05 level.

Problem 2: In 1990, the average farm size in Kansas was 694 acres. A researcher claims that the size has increased. A sample of 40 farms had a mean of 731 acres. Assume the population standard deviation is 212 acres. Test the claim at the 0.05 level of significance.

Problem 3: In 2004, the mean monthly cell phone bill in the US was $50.64. A market researcher believes that this figure has changed. A sample of 12 cell phones had a mean of $65.01. Assume the population standard deviation is $18.49. Test the claim that the amount has changed, using a 0.05 level of significance.