

**Hypothesis Test:** Procedure that allows us to ask a question about an unknown population parameter  
Uses sample data to draw a conclusion about the unknown population parameter.

**Steps to perform a Hypothesis Test**

- Step 1: Planning the test: Formulate questions as a pair of hypotheses  
*AND* set criteria for how to draw a conclusion from the data
- Step 2: *In real life: Gather Data:* Select random sample(s) and collect data.  
*In HW or exam problem:* Examine the given data and information, *and* determine how to perform test (which distribution and type of test to use)
- Step 3: Analyze sample data: Perform a probability calculation to find the "p value"
- Step 4: Decide what the data analysis shows about the hypotheses
- Step 5: Interpret the decision in the context of the problem.

**Write a null & alternate hypothesis for example A & B.**

**Step 1: Set up hypotheses that ask a question about the population by setting up two opposite statements about the possible value of the parameters.**

**Ho: Null hypothesis:** The assumption about the population parameter that will be believed unless it can be shown to be wrong beyond a reasonable doubt

**Ha: Alternate hypothesis:** The claim about the population parameter that must be shown correct "beyond a reasonable doubt" to believe that it is true.

*Statisticians design the hypothesis test so that the outcome that needs to be proved is the alternate hypothesis.*

**Example A:** A new surgery is being tested to determine if is effective in providing a cure.  
*The hypothesis test should be set up so that the surgery must be proven effective.*

- Ho: Null hypothesis: A new surgery is as effective as non-surgical treatment
- Ha: Alternate hypothesis: A new surgery is more effective than non-surgical treatment

A hospital is testing a new surgery for a type of knee injury. Many patients with knee injuries recover with non-surgical treatment, and surgery has risks. The surgery review board has decided that the hospital can perform this surgery as a clinical trial.  
After studying the medical considerations, they decide that they will approve this type of surgery for future use if the clinical trial shows that the surgery would cure more than 60% of all such injuries

$p =$  \_\_\_\_\_

Ho: Null hypothesis: \_\_\_\_\_

Ha: Alternate hypothesis: \_\_\_\_\_

**Example B:** FDA guidelines require that to be considered "fat-free", a serving of salad dressing must contain less than 1/2 gram of fat. A salad dressing manufacturer must be able to show that its salad dressing satisfies these guidelines in order to put the words "fat-free" on its label. (*one "serving" is 2 tablespoons of salad dressing*)

*The hypothesis test should be set up so that the manufacturer must prove that the salad dressing satisfies the regulations to call it "fat-free"*

$\mu =$  \_\_\_\_\_

Ho: Null hypothesis: \_\_\_\_\_

Ha: Alternate hypothesis: \_\_\_\_\_