Day 48 Intro to Hypothesis Testing

Is my sister a good free throw shooter?

My sister claims she is an 80% free throw shooter. To prove her skills she shoots 50 free throws and makes 32 shots. Is my sister exaggerating about her free throw skills?

There are two possible explanations for why my sister only made 32/50 shots.

1)

2)

Does the sample result give convincing evidence that my sister is exaggerating? Or is it plausible that an 80% shooter can have a performance this poor by chance alone? What would you need to be convinced one way or the other? Do you have tools you could use to answer this question? (Yes!)

Now we're going to answer this question more formally by carrying out something called a significance test (also known as a hypothesis test) in order to answer our question – is Ms. Neul's sister exaggerating about being an 80% free throw shooter?

We begin by writing our hypotheses.

Usually the **null hypothesis**, denoted H_0, is the opposite of what we want to show:

Then, we also have an **alternative hypothesis**, denoted H_a, which is what we hope to show is true:

An argument of this type is sometimes called a **reductio ad absurdum** argument. We make a hypothesis and hope that the observed evidence contradicts that hypothesis by so much as to make the original hypothesis seen ridiculous. In that case, we can reject our initial hypothesis.

To decide if we can reject the null hypothesis, we first must decide how extreme is too extreme. **Think: what would have convinced you that my sister was lying about her free throw shooting ability?**

alpha value:

p-value:

Now we will calculate the p-value. Note that what we are asking for when we ask for the p-value is **the probability of an 80% shooter making 32/50 or less baskets.** We already found this exact probability earlier on this worksheet!

What conclusion can we make, and why?

Assumptions and Conditions:

Steps:

Practice Writing Hypotheses

1. Write the null and alternative hypotheses you would use to test each of the following situations:

   a) In the 1950s only about 40% of high school graduates went on to college. Has the percentage increased?

   b) In the 1950s about 40% of high school graduates went on to college. Has the percentage changed?

   c) 20% of cars of a certain model have needed costly transmission work after being driven between 50,000 and 100,000 miles. The manufacturer hopes that a redesign of a transmission component has solved this problem.

   d) The dining hall heard that previously, 55% of Choate students were in favor of Veg-Out Mondays. They made some changes to the menus and now want to see if the opinions of the students have changed.