

§9.1A: Testing Hypotheses

Skills

- Write the null and alternate hypotheses for a test
 - Interpret the p -value of a test
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Hypothesis Tests

Intervals are used to figure out where the parameter is located

What if you have an idea about where the parameter is?

A hypothesis test enables you to determine if your belief about the parameter is reasonable

Hypotheses

There are two—the **null**, and the **alternate**

The **null** will be that the *parameter equals some value*

The alternate is an *inequality*...the type is given in the question somewhere

Examples

- A fish farmer wants to determine if the oxygen levels in his trout farm are too low to support the fish
 - A researcher wants to know if girls experience more math anxiety than boys
 - A mechanic wants to know if the diameter of an axle is the wrong size (too large or too small)
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A Little Theory

We assume that H_0 is true

Under that assumption, we'll calculate the probability of observing a sample as unusual, or more unusual, than the one we have

How do you decide if the sample is highly unusual?

p -value

This probability that we calculate is called a p -value.

When asked to interpret a p -value, remember that it is *the probability of obtaining a sample as unusual, or more unusual, than the actual sample*

Example

A clinical trial of Breathe-Right strips tested the hypotheses *no difference versus a placebo* against *there is a difference versus a placebo*. The p -value of the test was 0.369. Interpret this value.

Level of Significance

Significant means *rare*

There is some point beyond which we just can't believe that our original hypothesis is correct

The dividing line between “common” and “rare” is the *Level of Significance*

Notation: α

The Conclusion

If our sample is rare, then we will **reject the null hypothesis**

If our sample is common (not rare), then we **fail to reject the null hypothesis**

In practice, we reject when the p -value is smaller than α

We fail to reject when the p -value is greater than α

Example

A clinical trial of pain relievers tested a null of no difference in pain relief versus an alternate of a difference in pain relief. The p -value of the test was 0.036.

What should be concluded?

...now try some problems!
