V25 - Hypothesis Testing – Part 1

❑ What is Hypothesis Testing?

❑ Two types of hypotheses (null vs. alternative)

❑ Proof by Contradiction

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What is Hypothesis Testing?

❖ Just finished **Estimation** via _confidence intervals_ ✳

❖ Focus now on **Drawing Conclusions** using _hypothesis tests_ ✳

   <u>Equivalent</u> forms of _inference_

❖ Hypothesis Test:
   ☐ Uses sample information (e.g., sample average, sample size)
   ☐ To test claim or belief
   ☐ About a _parameter_ value (e.g., μ, $\mu_1 - \mu_2$, p, $\frac{\sigma_1^2}{\sigma_2^2}$)
   ☐ To draw conclusion

$\bar{X}$ n

2 Types of Hypotheses

1) Null hypothesis H_0 $H_0 : \mu = 30$

- Existing belief or claim about parameter value
  - Belief can be viewed as:
    - Status quo
    - Historical knowledge
  - May be posed as:
    - Advertised value
    - Standard or spec value

2) Alternative hypothesis H_1 or H_A $H_1 : \mu \neq 30$

- Directly opposes H_0
- New claim or belief one is testing
- "Research" hypothesis

2 Types of Hypotheses

Two possible conclusions:

1) Reject H_0 and ___accept H_1___

OR

2) Fail to Reject H_0

2 Types of Hypotheses

$H_0: \mu = 8.5$

(※) **If Reject H_0**
   it's because there's _Sufficient evidence in data to TO SU._ *(sample)*

(※) **If Fail to Reject H_0**
   it's because there's _INSUfficient evidence in data to do su_ *(sample)*

(※) **If Fail to Reject H_0**
   → This does <u>not</u> mean you accept H_o
   You should NOT say "Accept H_o"

Proof by Contradiction

Goal: Prove A to be true

1. Assume A is false
2. Proceed with proof
3. If obtain contradiction, then "assumption of A false" cannot be good/accurate

→ A must be true!

→ You've proven A to be true!

Will follow up in class

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