EPSY 5261 : Introductory Statistical Methods

Day 10

Hypothesis Testing for Proportions

Learning Goals

- At the end of this lesson, you should be able to…
  - List the steps of a hypothesis test
  - Describe the purpose of a hypothesis test
  - Describe a parametric approach to hypothesis testing for a single proportion
  - List the assumptions for using the Z-distribution to test a single proportion

Recall: Variable Types

- We have been working with quantitative data
  - The population mean (μ) has been our parameter of interest
- We can also do hypothesis testing to make inferences about categorical data
  - The population proportion (p) then becomes our parameter of interest

Hypothesis Testing

- Purpose: to test a claim about a population parameter
  - *RQ: Did the average movie length increase in 2022?*
  - *RQ: Are more than 10% of people in the world left-handed?*

Steps of Hypothesis Testing

1. Formulate a **research question**
2. Write your **hypotheses**
3. Find **Distribution** of the Null Hypothesis
4. **Compare** Sample to the Distribution of Null Hypothesis
5. Get a **p-value**
6. Make a **decision** to reject or fail to reject the p-value
7. Communicate your **conclusion** in context

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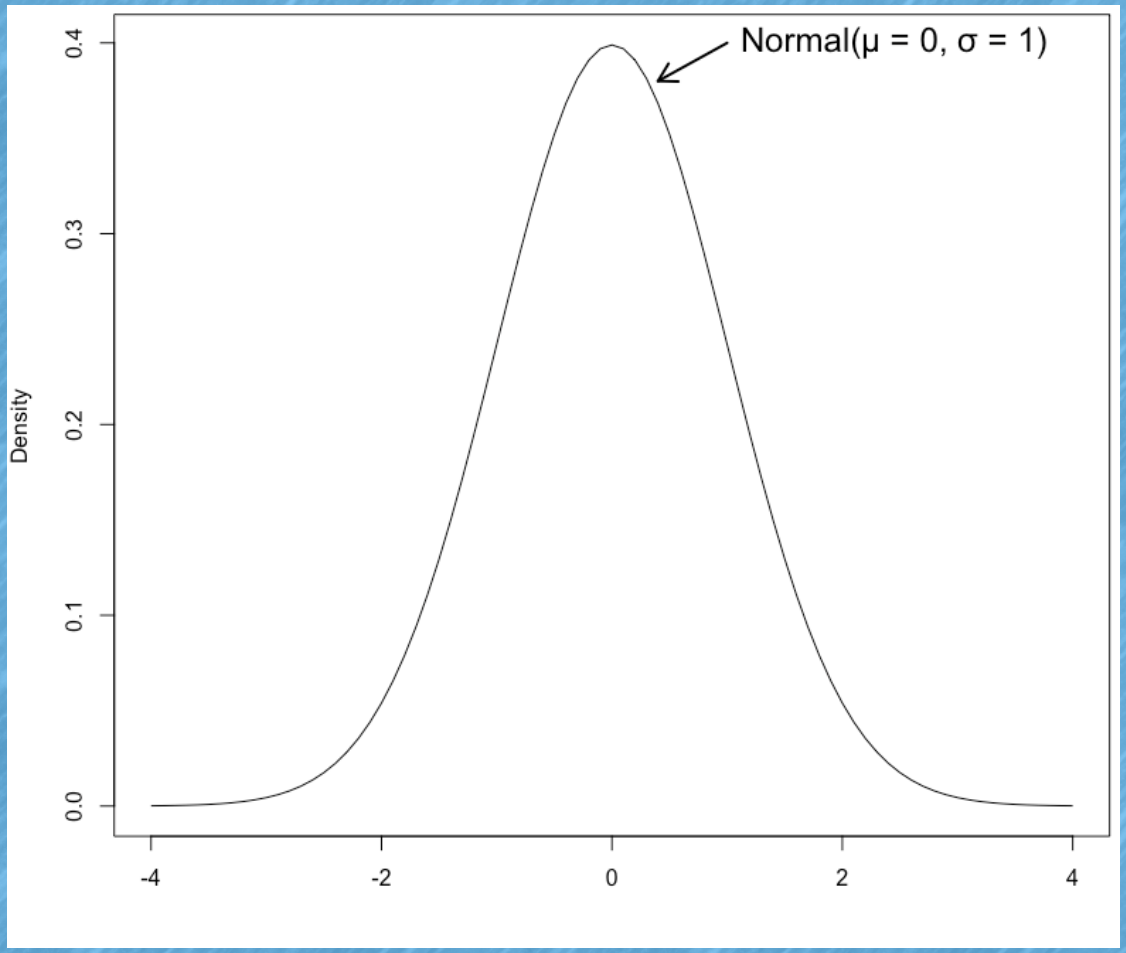
Theoretical Distribution

- Last class we used the t-distribution for our quantitative data
- However, we will use a different distribution for our categorical data

Normal Distributions

- Normal distributions are bell shaped & symmetric distributions characterized by:
  - Mean (center)
  - Standard deviation (estimate of variability)

Z-Distribution



Assumptions

- $n\hat{p} > 10$ and $n(1 - \hat{p})$
- If this is not met, better to use a randomization test

Use R Studio

- Use the z-distribution to help us get our estimate for the variability
- Use functions in R Studio to also give us our p-value
- We will explore the entire hypothesis test process in today's activity!

Z-test Hypothesis Testing Activity

Summary

- Hypothesis tests help us test a claim while taking into account sampling variability
- They provide one form of evidence to help answer a research question
- We can use a z-distribution to help us conduct our test when we have categorical data