# EPSY 5261 : Introductory Statistical Methods

Day 8

Simulation-Based Hypothesis Testing

# 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 simulation approach to hypothesis testing

# Hypothesis Testing

Purpose: to test a claim about a population parameter

# 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** based on the p-value
7. Communicate your **conclusion** in context

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3. Find **Distribution** Considering 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

# Estimating a Distribution

- **Goal:** Obtain an estimate for the sampling variability expected given this sample
  - Simulation (resampling methods)
  - Traditional Parametric Methods (a mathematical function)

# Estimating a Distribution

- Simulation (resampling methods)
- Traditional Parametric Methods (a mathematical function)

# Recall: Day 5 Activity

- We have used simulation to get an estimate for variability before!
- We will do the same process here with 1 minor change to ensure we are centered at the null hypothesized value (not our sample statistic)

# Sampling Distribution

- **Recall:** On Day 5, when we resampled we had a distribution centered at the sample statistic
- In hypothesis testing we want a distribution centered at the null hypothesized value
- We will explore the entire hypothesis test process in today's activity!

# Simulation Based Hypothesis Testing Activity

# Summary

- There are many steps to the hypothesis test
- 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
- Simulation is one method to conduct a hypothesis test (it helps us estimate sampling variability and visualize the null hypothesized model)