# 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 to reject or fail to reject the p-value
- 7. Communicate your **conclusion** in context

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#### Estimating a Distribution

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

#### Estimating a Distribution

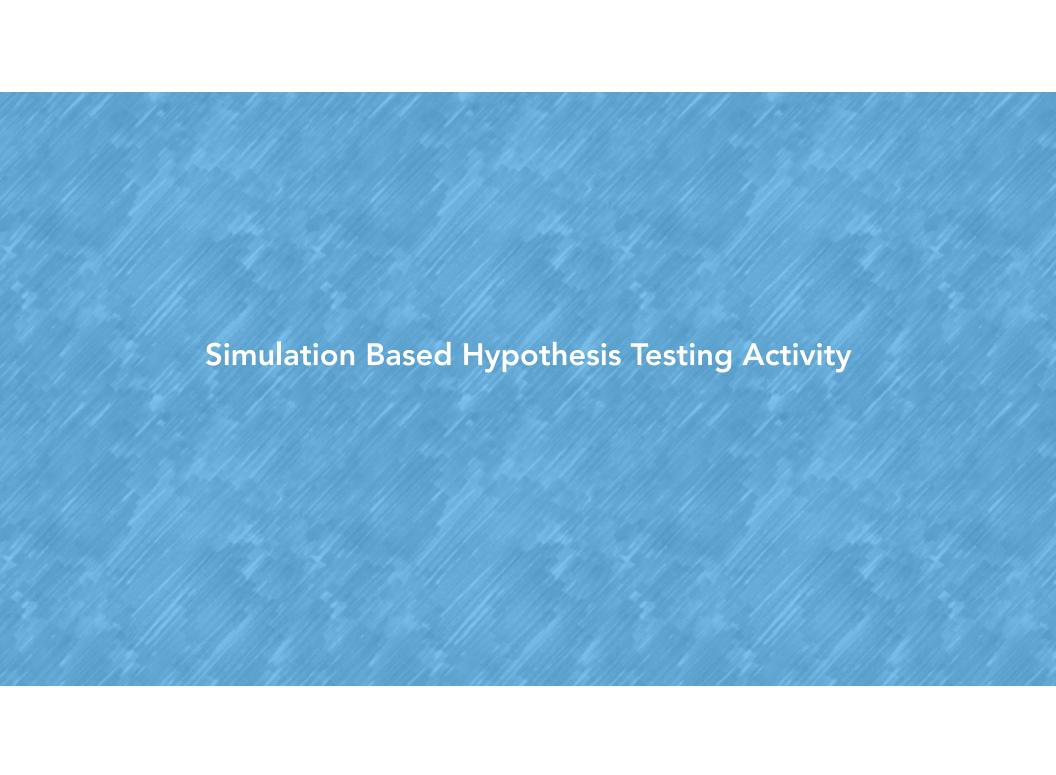
- Simulation (resampling methods)
- Traditional Parametric Methods (a mathematical function)

## 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 out sample statistic)

### Sampling Distribution

- Recall: in 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!



#### Summary

- There are many steps to the hypothesis test (overview on slide 9)
- 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)