

# Lecture 4: Continuing statistical simulations

# Last time

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

**Question:** How important is it that  $\varepsilon_i \sim N(0, \sigma^2)$ ? Does it matter if the errors are *not* normal?

# ADEMP: A useful framework for simulation studies

- **Aims:** Why are we doing the study?
- **Data generation:** How are the data simulated?
- **Estimand/target:** What are we estimating for each simulated dataset?
- **Methods:** What methods are we using for model fitting, estimation, etc?
- **Performance measures:** How do we measure performance of our chosen methods?

# ADEMP

For the normal errors simulation study:

- **Aims:**
- **Data generation:**
- **Estimand/target:**
- **Methods:**
- **Performance measures:**

## Another question

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

**Question:** How important is it that  $\varepsilon_i$  have constant variance?

With a neighbor, discuss the ADEMP steps you might use to answer this question (some of them will be similar to the normal simulation!). Then we will discuss together as a group.

# ADEMP steps

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

**Question:** How important is it that  $\varepsilon_i$  have constant variance?

# Class activity

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

How important is the constant variance assumption?

[https://sta279-s24.github.io/class\\_activities/ca\\_lecture\\_4.html](https://sta279-s24.github.io/class_activities/ca_lecture_4.html)

