GENERAL ASSEMBLY

INTRODUCTION TO STATISTICAL INFERENCE

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DATA SCIENCE WORKFLOW

1. Define the problem.
2. Obtain the data.
3. Explore the data.
4. Model the data.
5. Evaluate the model.
6. Answer the problem.

POPULATIONS

- Most data science problems have to do with studying **populations** in some form or another.

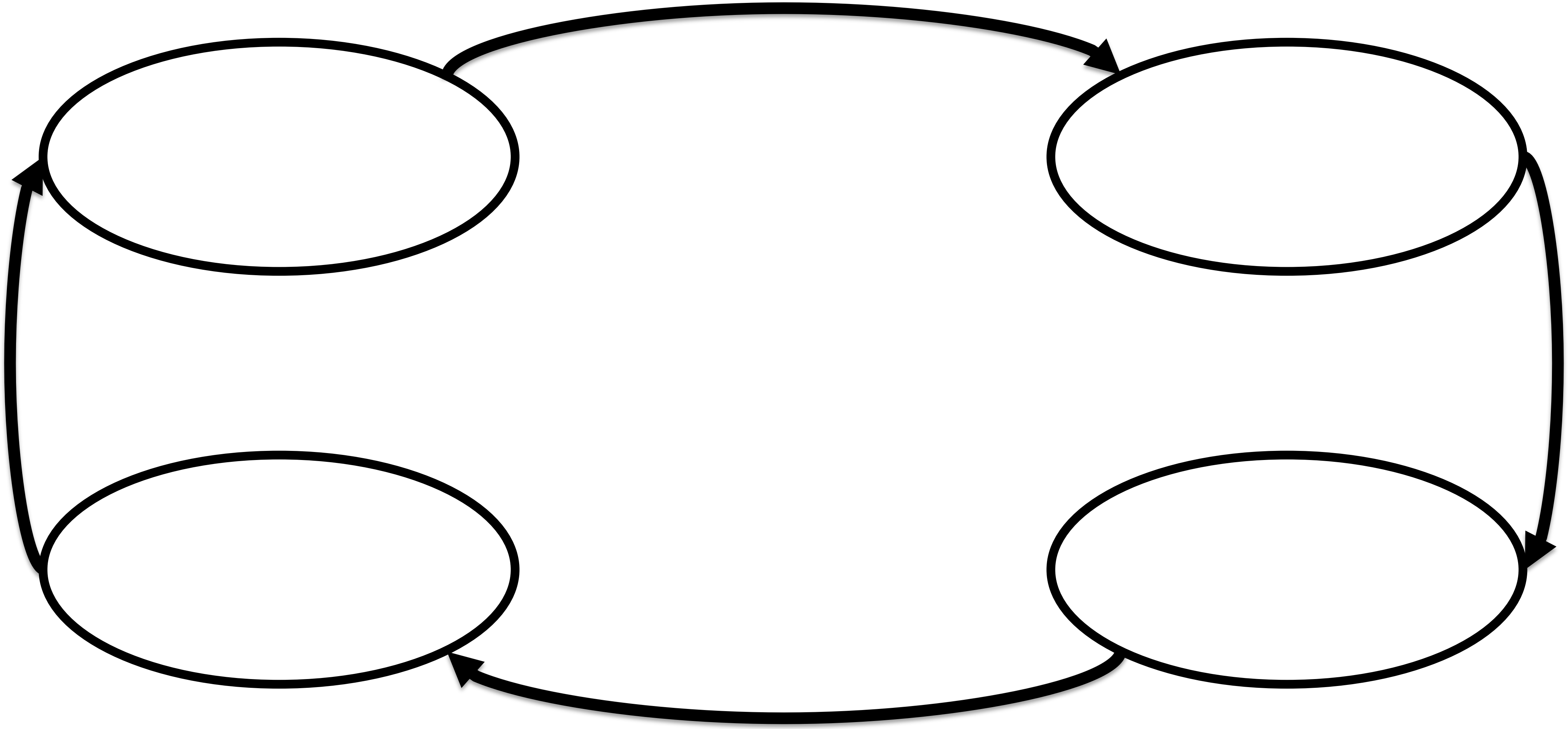
- Examples:
  - All undergraduates currently at Ohio State.
  - All microwaves constructed at my factory this year.
  - All hurricanes to enter the Gulf of Mexico.
  - All people who will vote in the 2020 election.
  - All states (and their average standardized test scores).

POPULATIONS

- If we're interested in learning about populations, why don't we just measure the population directly?

- What might we do instead?

GOAL: LEARNING ABOUT A POPULATION



EXAMPLE

- I want to see who will win the California U.S. Senate election in 2020. I call 1,000 registered voters and ask who they will support.

- Population:

- Sample:

- Statistic(s):

- Parameter(s):

EXAMPLE

- I developed a new drug (“New Drug”) that I believe reduces the diastolic blood pressure of adults over 50. I lead a clinical trial of 100 patients, where I compare my drug to the standard drug (“Old Drug”).
- Population:
- Sample:
- Statistic(s):
- Parameter(s):

STEPS

1. We identify our **population**.

2. We gather a **random sample** of data from the population.

3. We calculate some **statistic(s)** based on our sample.

4. Using statistics, we conduct inference on the **parameters**.

5. We use our understanding of **parameters** to make conclusions about the population.

STATISTICAL INFERENCE

- Today, we are going to discuss the process of **statistical inference**.
  - That is, how do we get from our **statistics** (measures of samples) to our **parameters** (measures of populations)?

- In frequentist statistical inference, there are two main ways to generalize from a sample to a population:
  - Confidence Intervals
  - Hypothesis Tests