

## MA 207, Guided Notes §4.1 – 4.3

### Gathering Data: Experiments and Observational Studies

**Def:** The \_\_\_\_\_ is the group of interest, i.e., those we want to learn about.

**Def:** In contrast to the population, a **sample** is the subset of the population we actually \_\_\_\_\_ .

**Question 1** Why do we almost always use a sample for data collection rather than the entire population?

### 1 Experimental and Observational Studies

**Def:** An **experiment** assigns subjects to experimental conditions and then observes the outcomes. The **outcomes** are observed values of the \_\_\_\_\_ variable, while the **treatments** are assigned values of the \_\_\_\_\_ variable.

**Def:** In contrast to an experimental study, an **observational study** merely \_\_\_\_\_ outcomes of the response and explanatory variables. An observational study does not impose treatments on the subjects.

**Question 2** Which type of study is better for establishing cause and effect?

**Question 3** Which type of study is generally easier and/or less expensive to carry out?

**Def:** A sample survey is \_\_\_\_\_

## 2 Good and Poor Sampling

**Question 4** Why is it important to select subjects randomly?

**Def:** A \_\_\_\_\_ is a sample of  $n$  subjects from a population where every subset of size  $n$  from the population is equally likely to be chosen.

**Def:** **Bias** in an experiment or observational study occurs when there is a systematic favoring of certain outcomes over others.

Define and provide an example for each type of bias in sample surveys below.

1. Sampling bias:

2. Nonresponse bias:

3. Response bias:

Define and provide an example for each type of poor sampling below:

1. Convenience samples:

2. Volunteer samples:

### 3 Good and Poor Experiments

In an experiment, experimental conditions are also known as \_\_\_\_\_

. Subjects are also known as \_\_\_\_\_ .

Question 5 What is the purpose of a **control group**?

Question 6 What is the **placebo effect** and why might an experimenter include a placebo group?

Question 7 Why is it important for experimenters to randomly assign subjects to treatments?

Question 8 What does it mean for a study to be **blind**?

Question 9 What is meant by the term **double-blind**?