Warmup

00 : 00 : 00

At a university, the probability that an incoming freshman will graduate within four years is 0.763. What is the probability that **_at most_** 50 out of a group of 80 incoming freshman will graduate in four years?

CDF

Trials - $N = 80$

$P = 0.763$

$X = 50$

.004

New Seating Chart

Study Guide for Assessment #3 - Tomorrow

1. The table below shows the probability distribution of the number of televisions in each house in a community. What is the probability that a house in the community will have at least three televisions?

2. If the probability of giving birth to a boy is 0.52, what is the approximate probability of giving birth to four consecutive boys?

3. How many ways can 10 juniors running for the positions of president, vice president, secretary, and treasurer be selected?

4. How many ways can 12 sophomores running for 5 identical positions of class representative?

5. A starting line for a hockey team should consist of 3 offensive players, 2 defensive players, 1 goaltender. A coach has 11 offensive players, 6 defensive players, and 2 goaltenders from which to choose the starting line. How many unique starting lines can the coach create?

6. It cost a bakery $3.50 to make apple pies that sell for $12 the first day they are baked.

- If a pie is not sold on the first day, the new price is $8.50.
- The probability of selling the apple pie the first day is 75%.
- There is a 12% probability of selling it on the second day.
- If the apple pie does not sell by the end of the second day, it is donated.

What is the approximate expected profit per pie for the bakery on the sale of its apple pie?

7. The number of household members, x, living in Cityville homes has the probability distribution below. What is the expected size of a household in Cityville?

8. Abby took an 8-question multiple-choice quiz. Suppose her probability of correctly answering any question is 0.75. What is Abby's probability of incorrectly answering exactly two questions on the quiz?

9. What is the middle term for the expansion of $(a + b)^7$?

10. What is the middle term for the expansion of $(2a - 3b)^8$?

Unit 2: Statistics

Today's Lesson

2.1 **Univariate Statistics**

Statistics Project
Due: Wednesday, September 30

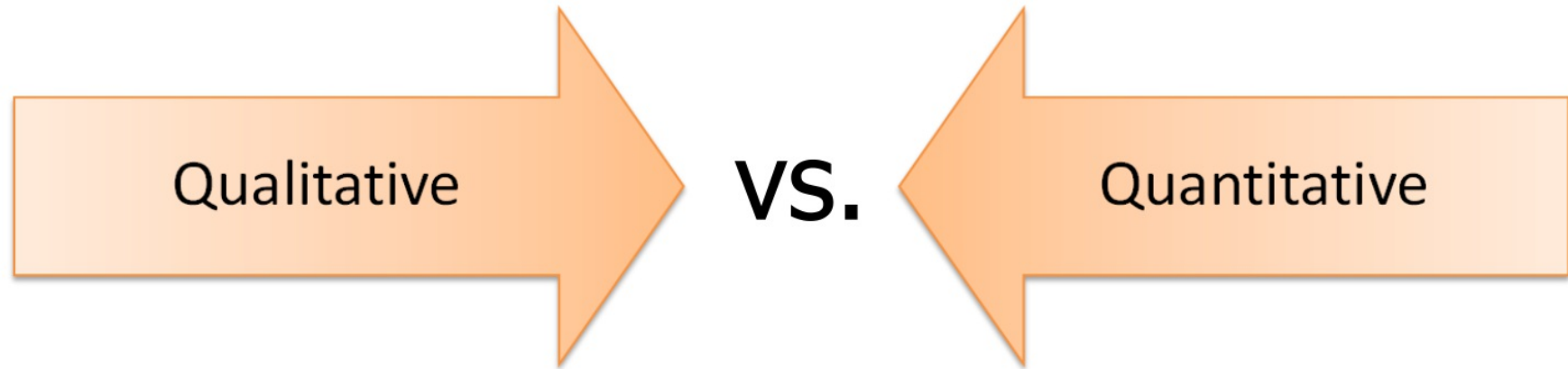# What is univariate data?

- the major purpose of univariate analysis is to describe **one variable**
- **central tendency:** mean, mode, median
- **variability:** range, max, min, quartiles, standard deviation
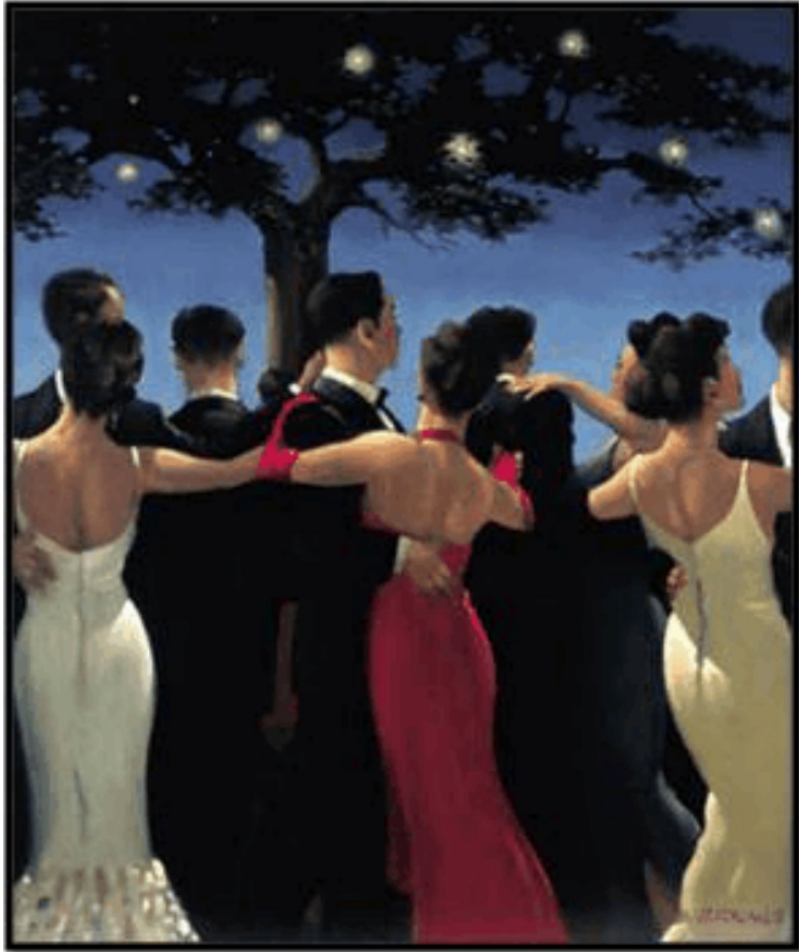- **graphs:** histogram, box-and-whisker plot

What type of data is it?

Qualitative **VS.** Quantitative

- Deals with descriptions.

- Data can be observed but **not measured.**

- Colors, textures, smells, tastes, appearance, beauty, etc.

- Deals with numbers.

- Data that can be **measured.**

- Length, height, area, volume, weight, speed, time, temperature, cost, ages, etc.

Example: A Painting

Qualitative	Quantitative
-Sky is blue -dresses are white and red -tuxedos are black	-9 people -8 branches -7 stars -4 women -6 men -10 people -2 white dress

Population vs. Sample

- Suppose that you were to conduct a study on college students smoking cigarettes. Who would you want to talk to?

- It would be ideal to interview <u>every student in the nation</u>, the **population**.

- It would be very impossible to contact every student, so we will choose a **sample**. Small group of people

Bias

What does it mean if someone calls you biased?

Bias occurs in statistics if data is skewed by factors that make it inaccurate.

Selection Bias

Selection bias involves the way people are chosen for a survey.

- **Undercoverage** - some members of the population are inadequately represented in the sample

- **Nonresponse bias** - individuals chosen for the sample are unwilling or unable to participate in the survey

Response Bias

Response bias involves the way people respond to a survey.

- **Voluntary response bias** - sample members are self-selected volunteers

- **Leading questions** - wording of the question may be loaded in some way to unfairly favor one response over another

Let's discuss!

In 1992, a Roper poll conducted for the American Jewish Community of the Holocaust asked:

"Does it seem possible or does it seem impossible to you that the Nazi extermination of the Jews never happened?"

The use of double negatives in this question caused confusion in the way people responded to the survey. 22% of those surveyed said that it was possible that the holocaust did not occur.

This is an example of a leading question!

Later, a new survey was conducted in which the question was rephrased:

"Does is seem possible to you that the Nazi extermination of the Jews never happened, or do you feel certain that it happened?"

In the new survey, only 1% of those surveyed stated that it was possible that the holocaust never occurred.

Social Desirability

Most people like to present themselves in a favorable light, so they'll lie to retain their **social desirability.**

People won't admit to racist attitudes, illegal activities, or unpopular opinions, especially if a survey is public.

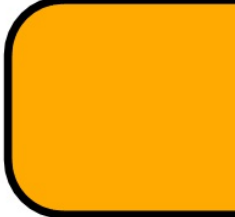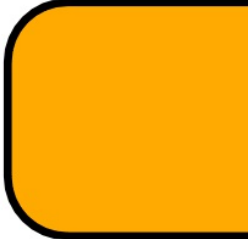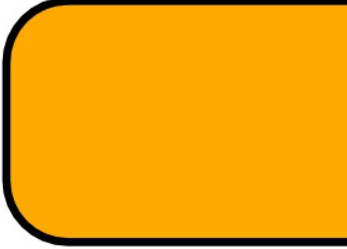# Recap: Bias

Selection Bias
- 1. Undercoverage
- 2. Non-response Bias

Response Bias
- 3. Voluntary Response Bias
- 4. Leading Questions
- 5. Social Desirability

Random Sampling

To guard against bias, we use **random sampling,** which simply means that the sample being surveyed is based on chance.

Example 1: Quantitative or Qualitative?

- Number of students in a class who turn in a project before it is due.   *Quant.*
- Gender of the next baby born at a hospital.   *Qual.*
- Amount of fluid ounces dispersed by a soda machine.   *Quan.*
- Thickness of the gelatin coating on a pill. *Quan.*
- Birth order (oldest, middle, youngest) of a student.

1   2   3   *Quan.*

Example 2: What kind of bias?

- A uniformed policeman interviews a group of high school students. He asks for the student's name and then asks if the student has used drugs in the last 30 days. *Social Desirability*

- A study on coronary problems was conducted using Duke University students. *Selection - undercovera*

- A survey about cafeteria food was conducted by leaving forms at the cash register. *Nonresponse*

Statistics Assignment 1

1. Pick 10 items in your home.

a) Describe 5 of these items **quantitatively.** Provide two different descriptors for each item.

b) Describe the other 5 items **qualitatively.** Provide three different descriptors for each item.

2. Comment on each of the following as a potential sample

question. Is the question clear? Is it slanted toward a desired response? Why?

a) Some cell phone users have developed brain cancer.

Should all cell phones come with a warning label explaining

the danger of using cell phones?

b) Do you agree that a national system of health insurance should

be favored because it would provide health insurance for everyone and

would reduce administrative costs?

c) In view of escalating environmental degradation and incipient resource

depletion, would you favor economic incentives for recycling of

resource-intensive consumer goods?