

1. A company database contains the following information about each employee: age, date hired, sex (male or female), ethnic group (Asian, black, Hispanic, etc.), job category (clerical, management, technical, etc.), yearly salary. Which of the following lists of variables are *all* numerical?

- (a) age, sex, ethnic group.                       (b) sex, ethnic group, job category.  
 (c) ethnic group, job category, yearly salary.     (d) yearly salary, age.  
(e) age, date hired.

2. Which of the following data types would be considered categorical data?

- (a) weight of newborn elephants                       (b) zip codes in New York State  
(c) height of basketball players                      (d) grade point average of seniors  
(e) number of pets in a household

3. Many people have trouble falling asleep. Researchers wish to determine if a new drug will help these sleep sufferers. To determine if the new medication is more effective than two of the popular sleep-inducing products currently on the market, the researchers use 140 volunteers who report having trouble sleeping. Sixty of the volunteers are randomly assigned to the new drug, and 40 each are randomly assigned to the other two sleep-inducing products. Researchers monitored each person and recorded how long it took them to fall asleep, how long they slept, and how many times they woke up in the night.

a) Is this an experiment or an observational study?

experiment

b) What are the individuals?

the 140 volunteers

c) What variables were measured?

- which drug they recieved
- how long it took to fall asleep
- how long they slept
- how many times they woke up

4. Two groups of students were tested to compare their speed working math problems. Each group was given the same problems. One group used calculators and the other group computed without calculators.

a) Identify the control group.

group without calculator

b) Identify the treatment group.

group with calculator

5. Does talking on mobile phones while driving distract people? Researchers measured the reaction times of 38 study participants as they talked on mobile phones and found that the average level of distraction from their driving was rated 2.25 out of 5.

a) Does this represent a census? Why or why not?

No - they only studied 38 people

b) Population: all drivers who talk on their phone

6. Which can provide evidence of a cause-and-effect relationship?

a) a census

b) an observational study

c) an experiment



Chapter One Quiz Review - Part 2

For questions 1-3, determine whether the following are examples of observational studies or experiments.

1) A researcher asks students the average number of hours of sleep they get per night and examines whether the amount of sleep affects students' grades.

observational study

2) A park employee wants to know if latex paint is more durable than non-latex paint. She paints 50 benches with latex paint, and 50 with non-latex paint. She compares the benches every month.

experiment

3) A researcher is considering three methods of evaluating two different cold medicines.

a) Randomly divide a group of 50 people with colds into two groups. Give each group a different medicine, and measure the length of the symptoms.

experiment

b) Monitor 50 people with colds, and measure the length of the symptoms for the individuals who choose to take each type of medicine.

observational study

4) One study of cell phones and the risk of brain cancer looked at a group of 469 people who have brain cancer. The investigators matched each cancer patient with a person of the same age, sex, and race who did not have brain cancer, then asked about the use of cell phones. Result: "Our data suggest that the use of hand-held cellular phones is not associated with risk of brain cancer."

a) Is this an observational study or an experiment? Justify your answer.

observational study → no treatment is being imposed

b) Based on this study, would you conclude that cell phones do not increase the risk of brain cancer? Why or why not?

no → observational studies do not provide sufficient evidence to prove a cause and effect relationship

5) An educational software company wants to compare the effectiveness of its computer animation for teaching biology with that of a textbook presentation. The company gives a biology pretest to each of a group of high school juniors, and then divides them into two groups. One group uses the animation, and the other studies the test. The company retests all students and compares the increase in biology test scores in the two groups.

a) Is this an observational study or an experiment? Justify your answer.

experiment → students are assigned to one of two groups and are dictated how to study (animation is the treatment)

b) If the group using the computer animation has a much higher average increase in test scores than the group using the textbook, what conclusions, if any, could the company draw?

They could likely conclude that using the animation to study leads to higher scores since they conducted an experiment

Problems 6-8 give examples of experiments. For each, identify the control group and treatment group.

6) You are on the HHS basketball team. You want to know if drinking water or drinking Gatorade during a game is more hydrating. The team has agreed to help you test your hypothesis during the next 6 games.

control group: those drinking water  
treatment group: those drinking Gatorade

7) You want to know if feeding rabbits corn is better for their growth than the normal feed pellets that they eat. You have 20 rabbits on which to perform your experiment.

control group: rabbits that eat normal feed pellets  
treatment group: rabbits that eat corn

8) You have heard that listening to Mozart while studying will help a student do better on the exam. Your class at school (about 100 students) has agreed to participate in your experiment.

control group: students who don't listen to Mozart while studying

treatment group: students who do listen to Mozart while studying



9) The FAA monitors airlines for safety and customer service. For each flight, the carrier must report the type of aircraft, flight number, number of passengers, and whether or not the flights departed and arrived on schedule. What variables are reported for each flight, and are they quantitative or categorical?

- ① type of aircraft → C
- ② flight number → Q
- ③ # of passengers → Q
- ④ departed/arrived on time → C

10) Determine if the variables listed below are quantitative or categorical. Neatly print "Q" for quantitative and "C" for categorical.

- |  |                                      |
|--|--------------------------------------|
| <u>Q</u> 1. Time it takes to get to school | <u>Q</u> 8. Height                   |
| <u>Q</u> 2. Number of shoes owned          | <u>Q</u> 9. Amount of oil spilled    |
| <u>C</u> 3. Hair color                     | <u>Q</u> 10. Age of Oscar winners    |
| <u>Q</u> 4. Temperature of a cup of coffee | <u>C</u> 11. Type of pain medication |
| <u>Q</u> 5. Teacher salaries               | <u>C</u> 12. Jellybean flavors       |
| <u>C</u> 6. Gender                         | <u>C</u> 13. Country of origin       |
| <u>C</u> 7. Facebook user                  | <u>C</u> 14. Type of meat            |

11) A recent survey by the alumni of a major university indicated that the average salary of 8,500 of its 250,000 graduates was \$123,000. Does this value describe a parameter or a statistic? WHY?

\$123,000 is a statistic since it was found using a sample of the graduates

12) A survey of 976 American households found that 32% of the households own two cars. Identify the population and the sample.

SAMPLE: 976 American households

POULATION: all American households

*For # 13- 15 Identify each of the following data sets as either: (P) Population or (S) Sample*

13) ...the age of a few randomly selected participants in a study about a race of runners

Sample

14) ...the annual salary of each full-time teacher in a study about Phoenix High School

population

15) ...a survey of 750 Georgia homeowners in a study about all of Georgia's homeowners.

sample

*For # 16- 18 Identify each of the following numerical values as either: (P) Parameter or (S) Statistic*

16) ... of a company's employees the opinion of just those that were there on time one morning about what they thought of a new training program.

Statistic

17) ... in a study about a small company of 25 employees, the range of their employee's salaries

parameter

18) ... in a study about the value of American homes in 2012, the average decrease of all the homes sold in Gwinnet

statistic

19) A beverage company wanted to see if people in the United States liked their new logo. Which choice **best** represents a population?

- a) A selection of logo artists.
- b) Every person in the United States.
- c) A selection of shoppers from different states.
- d) 3,800 children age 5 - 15

20) A musician wanted to see what people who bought his last album thought about the songs. Which choice **best** represents a sample?

- a) Every person who bought the album.
- b) 250 girls who bought the album.
- c) A selection of people who didn't want to buy the album.
- d) A selection of 3,294 people who bought the album.



21) A gaming website wanted to find out which console its visitors owned. Which choice **best** represents a population?

- a) Visitors to the 3DS section.      b) All of the website visitors.  
c) Visitors to the PS4 section.       d) Visitors who are on the website for more than 5 minutes.

22) Before a nation wide election, a polling place was trying to see who would win. Which choice **best** represents a sample?

- a) A selection of voters over age 50.      b) A selection of male voters.  
 c) A selection of voters of different ages.      d) All voters.

23) A toy store owner tracking how much kids spend each month on toys. Which choice **best** represents a population?

- a) All of the kids who buy toys.      b) 227 rich kids.  
c) 228 boys age 7 - 15      d) 235 kids from age 10 to 15.

24) A mayor wanted to see if the people in his town thought he was doing a good job. Which choice **best** represents a sample?

- a) 1,000 unemployed voters.      b) The mayor's family.  
c) The residents of the town.       d) 242 voters.

25) Identify the population and the sample in each of the following situations.

a. A realtor is interested in the median selling price of homes in Worcester County, Massachusetts. She collects data on the selling prices of 50 homes.

SAMPLE: 50 homes for sale in Worcester County

POULATION: all homes for sale in Worcester County

b. A psychologist is concerned about the health of veterans who served in combat. She examines 25 veterans to assess whether or not they are showing signs of post-traumatic stress disorder (PTSD).

SAMPLE: 25 veterans who served in combat

POULATION: all veterans who served in combat

c. An educator asks 20 seniors from Eastern Connecticut State University whether or not they had taken an online course while at the university.

SAMPLE: 20 seniors from ECSU

POULATION: all seniors from ECSU