Experimental Design Homework (Data Collection Methods)

Directions: Be sure to show all work, communicate your thought process, and justify your reasoning. Remember to check that your answers are complete, correct, and reasonable.

1. Indentify the data collection method that would be most appropriate for each situation. Justify your choice.

WORD BANK

Census Survey	Experiment
Observational Study	Sampling Survey
Simulation	

a. A researcher watches people at Starbucks at the same time each day and records how many use their laptops.

b. A study is conducted to determine whether the color of a toy effects a dog's desire to play with the toy.

c. Every person who is registered for fitness classes at a YMCA is surveyed on his/her favorite class.

d. A study is conducted to determine the effects of changing a one-way street to a two-way street on motor vehicle accidents.

e. A study is conducted to determine if replacing one sugary snack a day with a fresh plum will have an effect on one's health.

f. Every 10th customer at Target is asked how often they purchase coffee from Starbucks, to determine if it is worth putting a Starbucks next to Target.

2. Identify whether or not each would produce biased results, and explain why the results would be biased if so.

a. Every 5th household on Ciro's Pizzeria's mailing list in Staten Island, NY is asked which pizzeria in Staten Island is their favorite.

b. Workers who tend to work overtime are asked about their salaries.

c. The number of peaches on every third tree in a peach field is recorded.

d. Every patient at a doctor's office is asked if he/she smokes, and how often.

e. Every person at a U2 concert is asked what their favorite U2 album is.

3. Answer each multiple-choice question.

a. A local soup kitchen is trying to determine if more space and food is needed to serve the less fortunate in the community. The soup kitchen serves a meal twice every weekend. Which of the following would be the most accurate way to determine this information?

    I. Record the number of under-fortuned people who attend the soup kitchen at random weeks in the months of November and December.

    II. Survey people who work at the soup kitchen about how much food they serve at each meal and how crowded each meal is.

    III. For random meals, count the number of under-fortuned people who attend, as well as how many plates each eats and how many did not make it into the soup kitchen in time for the meal.

    IV. Survey random under-fortuned people regarding how often they attend the soup kitchen, whether or not enough food is available, and whether or not they have ever waited in line and not made it in in time.

b. A study conducted on how long women prefer to complete 1 minute jog : 30 seconds sprint intervals for found that the average amount of time women under the age of 40 preferred to do this exercise for was 27 minutes. Which is a correct inference?

    I. On average, men will not complete such intervals for 27 minutes.

    II. On average, people under the age of forty will complete such intervals for 27 minutes.

    III. On average, women under the age of forty complete such intervals for 27 minutes.

    IV. On average, women over the age of forty will not complete such intervals.

c. A study is conducted to determine how many hours high school students spend doing activities outside, and which group of high school students (freshman, sophomores, juniors, or seniors) spend the most time doing activities outdoors. 45 students at a high school in Long Branch, New Jersey were randomly selected, and it was determined that sophomores spend the most time outside. What is the sample?

    I. All students at the high school in Long Branch.

    II. The 45 students surveyed at the high school in Long Branch.

    III. All sophomores at the high school in Long Branch.

    IV. The sophomores at the high school in Long Branch who were also part of the 45 selected students.

d. In order to determine whether or not American citizens would support a policy on having an earlier curfew for young drivers, 20,000 text messages are sent out to cellular phones that are able to receive and send text messages free of charge. Assuming that a reply is recorded for all 20,000 test messages, why is this sample unlikely to be a sufficient representation of the population of America?

       I. People in America have more important issues to worry about, so they will not express a strong concern regarding this issue.

       II. The Americans who receive the text messages will most likely be young drivers, who will be biased against the curfew.

       III. Many Americans who receive the text messages will not be affected by the issue, and therefore will not express a strong concern.

       IV. There is no method of verifying the population of Americans who will receive the text messages in order to determine if the sample is biased.

e. Which type of study is most seldom at random?

       I. Sample Survey   II. Experiment

f. A researcher would like to see if drinking coffee daily has any effects on migraines. Which would be the best sample for the study, and what type of study would this be?
       I. Randomly selected people who currently drink coffee daily; experiment
       II. Randomly selected people who do not currently drink coffee daily; experiment
       III. Randomly selected people who currently drink coffee daily; observational
       IV. People who have reported having migraines frequently; observational

g. Ana asked eight people at a circus what they thought of how circus animals are treated. What is the population where the sample came from, and is the sample likely to be biased?
       I. All people who have ever attended a circus; biased
       II. All people sitting in the same area at the same circus as Ana; unbiased
       III. All people Ana spoke to at the circus ; unbiased
       IV. All people at the same circus as Ana; biased

Expect a quick quiz on these ideas, as well as qualitative vs. quantitative data and parameters vs. statistics tomorrow! ☺

<u>Selected Solutions</u>
1. a. Observational study; the observer watches and records but does not influence the results
c. Census survey; the entire population of people registered for classes are selected
e. Experiment; some people will make the replacement, while others will not

2. a. Yes, there will be bias because all of the people surveyed are on Ciro's mailing list, thus not a quality representation of all people who visit Staten Island pizzerias
c. Unbiased
e. This is biased, because the people at one concert are not a quality representation of all U2 fans

3.
a. III.
c. III.
e. II.
g. IV.