Assignment - Chapter 02

Complete the following problems related to Chapter 2. Upload to Canvas a single pdf containing your work before the deadline.

1. **Bullying.** Researchers studied the impact of sleep patterns of 5000 college students from various universities to determine it's impact on academic performance. What is the population in this study? What is the sample? What variables do the researchers measure? Is the study described above an experiment or an observational study?

2. **Choose your study type.** What is the best way to answer each of the questions below: an experiment, a sample survey, or an observational study? Explain your choices.

   (a) Are college students satisfied with the cost of textbooks that they are required to purchase?

   (b) Is your school's football team called for fewer penalties in home games than in away games?

   (c) Do college students who have access to video recordings of course lectures perform better in the course than those who don't?

3. **Sampling methods.** I plan to take a sample of 10 students in my introductory statistics class. For each of the following scenarios, identify the sampling method involved.

   (a) I choose the 10 students sitting in the front row.

   (b) I choose the first 10 students who enter the classroom. Students arrive at random time in the classroom.

   (c) I write the names of all the students on similar slips of paper, put the slips of paper in a box, mix them well, and draw 10 slips from the box. The 10 names drawn are my sample.

4. **Call-in versus random sample polls.** A national survey of TV network news viewers found that 48% said they would believe a phone-in poll of 300,000 persons rather than a random sample of 1000 persons. Of the viewers, 42% said they would believe the random sample poll. Explain to someone who knows no statistics why the opinions of only 1000 randomly chosen respondents are a better guide to what all people think than the opinions of 300,000 callers.

5. **Sampling issues.** A sample of households in a community is selected at random from the telephone directory. In this community, 4% of households have no telephone, 10% have only cell phones, and another 25% have unlisted telephone numbers. Can you find any sampling or non-sampling errors with this sample? Explain your reasoning.

6. **Planning a survey of students.** The student government plans to ask a random sample of students their opinions about on-campus parking. The university provides a list of the 20,000 enrolled students to serve as a sampling frame. How would you choose a simple

random sample of 200 students? How would you choose a systematic random sample of 200 students? The list shows whether students live on campus (8000 students) or off campus (12,000 students). How would you choose a stratified sample of 50 on-campus students and 150 off-campus students?

7. Researchers are interested in studying the effect of room color on test performance. They recruit 100 students and randomly assign them to take a test in either a blue room or a red room. The researchers are interested in how the color of the room affects the students' test scores. They hypothesize that the color red may cause anxiety and negatively impact test performance. List out the explanatory variable, response variable, possible lukring variables, and design the experimental outline.

8. **Does church attendance lengthen people's lives?** One study of the effect of attendance at religious services gathered data from 2001 obituaries. The researchers measured whether the obituary mentioned religious activities and length of life. List out the explanatory and response variables.

9. To study the effects of different study environments on student performance, researchers recruit 200 students. They are interested in whether a quiet study environment or a collaborative study environment is more conducive to learning. They randomly assign 100 students to study in a quiet environment and 100 students to study in a collaborative environment. Half of the students in each group are assigned to study math, and the other half are assigned to study science. Draw an outline of this experiment. What is the outline of the experiment you just designed called?

10. **Do antioxidants prevent cancer?** It is known that people who eat lots of fruits and vegetables have lower rates of colon cancer than those who eat little of these foods. Fruits and vegetables are rich in "antioxidants" such as vitamins A, C, and E. Will taking antioxidants help prevent colon cancer? A clinical trial studied this question with 864 people who were at risk for colon cancer. The subjects were divided into four groups: daily beta-carotene, daily vitamins C and E, all three vitamins every day, and daily placebo. After four years, the researchers were surprised to find no significant difference in colon cancer among the groups.