

PROB STAT HONORS

Name _____

UNIT 5 REVIEW

1. 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, gender, and race who did not have brain cancer, then asked about the use of cell phones. Result: “Our data suggest that the use of handheld cellular phones is not associated with risk of brain cancer.”

Is this an observational study or an experiment?

A maker of fabric for clothing is setting up a new line to “finish” the raw fabric. The line will use either metal rollers or natural-bristle rollers to raise the surface of the fabric; a dyeing-cycle time of either 30 or 40 minutes; and a temperature of either 150° or 175° Celsius. An experiment will compare all combinations of these choices. Three specimens of fabric will be subjected to each treatment and scored for quality.

2. What are the experimental units in this experiment?
3. What are the explanatory variables in this experiment?
4. What are the treatments in this experiment?
5. What is the response variable in this experiment?

For each of the following data gathering scenarios, determine the sampling method that is being described.

6. To obtain a sample of those attending a basketball game, a researcher selects the 24th person through the door.
7. To estimate the average cost of malpractice insurance, a researcher decides to classify the population of all doctors practicing in a particular metropolitan area as being made up of four groups: surgeons, internists and family practitioners, obstetricians, and all other areas of specialization. The researcher then takes separate simple random samples of doctors from each of these groups and interviews them about malpractice insurance.
8. At a University, the registrar’s office randomly selects four majors that the University offers, then contacts every student pursuing that major and conducts a University Satisfaction Survey.

Identify the type of bias present in each of the following data gathering scenarios.

9. In order to understand young mothers in the U.S., a random sample of births recorded in South Carolina is obtained and the mothers of those children are surveyed.

10. A researcher interviews every 25th person who enters a bar near a University and asks their opinion about the minimum drinking age.

11. The Quality Assurance Manager at an office checks the third box of specialty paper delivered to the office for defects before deciding whether or not to accept or reject the shipment.

The extracts of avocado and soybean oils have been shown to slow cell inflammation in test tubes. Will taking avocado and soybean unsaponifiables (called ASU) help relieve pain for subjects with joint stiffness due to arthritis? In an experiment, 345 volunteers were randomly assigned to receive either 300 milligrams of ASU daily for three years or a placebo daily for three years.

12. Does this experiment have a control group? Explain.

13. Why is it important that the researchers randomly assign the volunteers to the treatment groups?

14. How does this experiment deal with replication?

15. Could this experiment be double blind? Explain.

A football coach hears that a new exercise program will increase upper body strength better than lifting weights. He is eager to test this new program in the offseason with the players on his high school team. The coach decides to let his players choose which of the two treatments they will undergo for 3 weeks—exercise or weight lifting. He will use the number of push-ups a player can do at the end of the experiment as the response variable.

16. Which principle of experimental design does the coach's plan violate?

17. Explain how this violation could lead to confounding.

18. Does talking on a hands-free cell phone distract drivers? Researchers recruit 40 student subjects for an experiment to investigate this question. They have a driving simulator equipped with a hands-free phone for use in the study. Each subject will complete two sessions in the simulator: one while talking on the hands-free phone and the other while just driving. The order of the two sessions for each subject will be determined at random. The route, driving conditions, and traffic flow will be the same in both sessions.

What type of design did the researchers use in their study?

19. Researchers from the Institute of Psychiatry at Kings College London randomly divided volunteers into two groups. Each subject took an IQ test. One group had to check email and respond to instant messages while taking the test, while the second group took the test without any distraction.

What type of design did the researchers use in their study?