

Homework for getting a 5 on AP Exam

1. One study of cell phones and the risk of brain cancer looked at a group of 469 people who have brain cancer. The investigation 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.”

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

(b) Based on this study, would you conclude that cell phones do not increase the risk of brain cancer? Why or why not? Is there a possible lurking/confounding variable? If yes, explain.

2. A researcher observes that, on average, the number of divorces in cities with Major League Baseball teams is larger than in cities without Major League Baseball teams. Identify a lurking variable that may lead to confounding with the effects of cities with MLB teams. Explain how confounding might occur.

3. You can use Voice over Internet Protocol (VoIP) to make long-distance telephone calls over the Internet. How will the cost affect the use of this service? A university plans an experiment to find out. It will offer the service to all 350 students in one of its dormitories. Some students will pay a low flat rate. Others will pay higher rates at peak periods and very low rates off-peak. The university is interested in the amount and time of use and in the effect on the congestion of the network. Identify the experimental subjects, the factors, the treatments, and the response variables.

4. Does day care help low-income children stay in school and hold good jobs later in life? The Carolina Abecedarian Project has followed a group of 111 children since 1972. Back then, these individuals were all healthy but low-income black infants in Chapel Hill, NC. All the infants received nutritional supplements and help from social workers. Half were also assigned at random to an intensive preschool program.

(a) Explain the purpose of each of the three experimental design principles.

(b) Describe how each of these principles was used in the study.

5. The progress of a type of cancer differs in women and men. Researchers want to design an experiment to compare three therapies for this cancer. They recruit 500 male and 300 female patients who are willing to serve as subjects.

(a) Which are the blocks in this experiment: the cancer therapies or the two sexes? Why?

(b) What are the advantages of a randomized block design over a completely randomized design using these 800 subjects?

(c) Suppose the researchers had 800 male and no female subjects for the study. What advantages would this offer? What disadvantage?

6. A group of students wanted to perform an experiment to determine whether Brand A or Brand B deodorants lasts longer. One group member suggests the following design—recruit 40 student volunteers—20 male and 20 female. Separate by gender, since male and female bodies might respond differently to deodorant. Give all the males Brand A deodorant and all the females Brand B. Have each student rate how well the deodorant is still working at the end of the school day on a scale from 0 to 10. Then compare ratings for the two treatments.

(a) Identify any flaws you see in the proposed design of this experiment.

(b) Describe how you would design the experiment. Explain how your design addresses each of the problems you identified in part (a).