Experimental Design

1. What is the best way to answer each of the questions below: an experiment, a sample survey, or an observational study that is not a sample survey? Explain your choices.

   (a) Are people generally satisfied with how things are going in the country right now?

   (b) Do college students learn basic accounting better in a classroom or using an online course?

   (c) How long do your teachers wait, on average, after they ask their class a question for students to respond?

2. Students sign up to be subjects in a psychology experiment. When they arrive, they are told that interviews are running late and are taken to a waiting room. The experimenters then stage a theft of a valuable object left in the waiting room. Some subjects are alone with the thief, and others are in pairs. Will the subject report the theft? The students had agreed to take part in an unspecified study, and the true nature of the experiment is explained to them afterward.

   - What are the treatments being compared?
   - What is the explanatory variable?
   - What is the response variable?
   - Do you think this study is ethically OK? Why or why not?

3. For each of the following pairs of variables, a statistically signficant positive relationship has been observed. Identify a third variable that might cause the spurious correlation.

   (a) The amount of ice cream sold in New England and the number of deaths by drowning

   (b) The size of a hospital (measured by its number of beds) and the median number of days that patients remain in the hospital

   (c) The salary of U.S. ministers and the price of vodka

   (d) The number of doctors in a region and the number of crimes committed in that region

   (e) The number of storks sighted and the population of Oldenburg, Germany, over a six-year period

   (f) The amount of coffee consumed and the prevalence of lung cancer

4. A study is designed to test the effect of light level and noise level on exam performance of students. The researcher also believes that light and noise levels might have different effects on males and females, so wants to make sure both genders are represented equally under different conditions. Which of the below is correct?

   (a) There are 3 explanatory variables (light, noise, gender) and 1 response variable (exam performance)

   (b) There are 2 explanatory vars (light and noise), 1 blocking var

   (c) There is 1 explanatory var (gender) and 3 response vars (light, noise, exam performance)

   (d) There are 2 blocking vars (light and noise), 1 explanatory var (gender), and 1 response var (exam performance)