Assignment 8

Due Wednesday May 6

1. A pastor expects hi parishioners to spend some time each week in a Bible study. He randomly selects 30 parishioners from among those coming to church one Sunday and asks each the number of minutes spent reading the bible during the pervious week. Using this data, the pastor's secretary, who once took a college statistics class, calculates the following:

$$n = 30, \quad \overline{x} = 31.2, \quad s = 13.2, \quad \text{Min} = 13.5$$

$$Q_1 = 18.7, \quad \text{Med} = 27, \quad Q_3 = 41.2, \quad \text{Max} = 57$$

The pastor asks the secretary to compute a confidence interval estimate of the mean number of minutes parishioners read the bible weekly. Comment on this study, including all necessary assumptions and how well they are me. (You are not asked to calculate the confidence interval).

2. A high school math department conducts a study to determine whether a classroom with windows leads to higher exam scores than a classroom without any windows. Two algebra classes are scheduled, each with 25 students. It is randomly decided which class will use which classroom. During the year, each teacher administers the same exams. At the end of the academic year, overall exam grades are compared.

   (a) Identify the response variable, the treatments, and the experimental units.

   (b) Was randomization properly used? Explain.

   (c) was replication properly used? Explain

   (d) Teacher is a confounding variable. Explain.

3. A popular office chain has 11,500 stores in the U.S. and 13,500 stores outside the U.S. Each store has approximately 10 full-time employees. Suppose the company would like to survey 250 of its employees about new coffee drinks under consideration. Under discussion are three sampling methods.

    1. A simple random sample
    2. Randomly pick 125 of their 115000 U.S. full-time employees and randomly pick 125 of their 135000 non-U.S. full-time employees
    3. Randomly pick 25 of their 25000 stores and pick all full-time employees at these 25 stores

    (a) Give a design for carrying out method 1, and give a disadvantage of using method 1.

    (b) What is method 2 called? What is an advantage of method 2 in this context?

    (c) What is method 3 called? What is an advantage of method 3 in this context?

4. A reading specialist plans a study to determine if high school students read faster from a physical book or an iPad. The reading specialist randomly selects 60 high school students for the study.

   (a) Describe a randomization process and an inference procedure for the study to be conducted with a completely randomized design.

   (b) Describe a randomization process and an inference procedure for the study to be conducted with a matched pairs design.