# Problem set 6

S520 Fall 2023

**Upload a HTML/PDF file with your answers to all questions and a .R/.Rmd file with your code through the Assignments tab on Canvas by 11:59 pm, Thursday 12th October.** Use R Markdown unless you have a good reason not to.

1. (5 points.) In the Powerball lottery, there are 59 white balls, numbered 1 to 59. Each week, five of the white balls are drawn, without replacement. In the past, the most frequently occurring white ball has been 23.

   (a) In the next lottery, will the probability of drawing the number 23 be greater than 5/59, less than 5/59, or equal to 5/59?

   Before one season, the Oakland A's were considered to be an average major league baseball team, predicted to win half (81) of their 162 games. They win the first six games of the season.

   (b) True or false: After the first six games, the best prediction of the total number of games the Oakland A's win that season is 162 out of 162.

   (c) True or false: After the first six games, the best prediction of the total number of games the Oakland A's win that season is still 81 out of 162.

   I survey a simple random sample of 1000 U.S. households and find out their income.

   (d) True or false: By the Central Limit Theorem, the incomes in the population will have an approximately normal distribution.

   (e) True or false: By the Central Limit Theorem, the incomes in the sample will have an approximately normal distribution.

2. (10 points.) Trosset chapter 7.7 exercise 4. Data: `https://mtrosset.pages.iu.edu/StatInfeR/Data/sample774.dat`. You can read the data straight in from the web:

   ```
   sample774 <- scan("https://mtrosset.pages.iu.edu/StatInfeR/Data/sample774.dat")
   ```

3. (5 points.) Trosset chapter 7.7 exercise 7.

4. (5 points.) Trosset chapter 8.4 exercise 1.

5. (5 points.) Trosset chapter 8.4 exercise 4. Assume that twenty pairs of batteries is enough for the Central Limit Theorem to approximately hold.