Problem set 5

S520

Upload your answers through the Assignments tab on Canvas by 11:59 pm, Thursday 28th September.

Please submit the following:

- One file with your write-up for questions 1–5 as a PDF (preferred), HTML, or Word document. This should include any important lines of code.
- One file with all your code for questions 1–5 as a .Rmd (preferred) or .R file.
- Your *knitted* file with your answers to question 6 (`fly-wings.html` or `fly-wings.pdf`). (You do not have to upload the original `fly-wings.Rmd` file.)

1. Trosset chapter 6.4 exercise 3.
2. The heights of adult women follow an approximately normal distribution with mean 63.8 inches and SD 2.9 inches.
   (a) What percentage of adult women are taller than 65.5 inches?
   (b) What is the interquartile range of adult women's heights?
   (c) Complete the following, rounding to the nearest 0.1 of an inch: "The shortest 2.5% of women are shorter than —, while the tallest 2.5% of women are taller than —."
3. (From the Fall 2014 takehome.) Let X be a standard normal random variable. Let $Y = X^2$.
   (a) Find $P(Y > 1)$.
   (b) Find the 0.9-quantile of Y.
4. Let X be a continuous random variable with PDF
$$f(x) = \begin{cases} 0.3 & 0 \le x < 1 \\ 0.7 & 1 \le x < 2 \\ 0 & \text{otherwise} \end{cases}.$$
   (a) Find is the constant value a that minimizes $E|X - a|$.
   (b) Find the constant value b that minimizes $E[(X - b)^2]$.
5. The file `IUSalaries2023.csv` contains the salaries of IU Bloomington academic faculty for the 2023–24 academic year (this is publicly available information.) Read this data into R, e.g. by using the function `read.csv()`.

   Dr. Luen's salary is $81,902. What is the percentile rank of his salary among IUB academic faculty? Remember to include your code.

6. Fill in the file `fly-wings.Rmd`, replacing the ??????s with appropriate content. Knit the file to HTML or PDF, and upload this knitted file as part of your submission.