Problem set 5

Online S520

Upload your answers through the Assignments tab on Canvas

1. (5 points) Let X be a continuous random variable with PDF

$$f(x) = \begin{cases} 0.3 & 0 \leq x < 1 \\ 0.7 & 1 \leq x < 2 \\ 0 & \text{otherwise} \end{cases}.$$

   (a) Find the median of X.

   (b) Find the expected value of X.

2. (5 points) Trosset chapter 6.4 exercise 1.

3. (5 points) Trosset chapter 6.4 exercise 7.

4. (5 points) The manager of a healthy food store has determined that the weekly demand for a popular type of granola is a normally distributed random variable with mean 85 pounds and standard deviation 5 pounds. If the demand for a given week falls within the lowest 2.5% of all possible values for the weekly demand, the price of the granola will be reduced for the following week. Calculate the value in pounds (lbs) for the weekly demand below which the manager will have to reduce the price. (Use R and give code)

5. (5 points) Trosset chapter 6.4 exercise 5. (Use R and give code)

6. (5 points) Let X be a standard normal random variable. Let $Y = X^2$. Find the 0.9-quantile of Y. (Use R and give code.)

   Notes:

   - You are not expected to and don't need to figure out the distribution of Y. Just convert the quantile of Y to a quantile of X.
   - Algebra review:

$$x^2 < 4 \Longrightarrow |x| < 2 \Longrightarrow -2 < x < 2$$

$$x^2 > 4 \Longrightarrow |x| > 2 \Longrightarrow x > 2 \text{ or } x < -2$$

$$1 < x^2 < 4 \Longrightarrow 1 < |x| < 2 \Longrightarrow 1 < x < 2 \text{ or } -2 < x < -1$$

   - Use R to find the final results