Homework 3

S520

Due at the beginning of class, Thursday 4th February

Trosset question numbers refer to the hardcover textbook. Show all working.

1. Trosset exercise 4.5.10
2. Trosset exercise 4.5.14
3. Trosset exercise 5.6.2
4. Trosset exercise 5.6.3
5. Consider an unfair six-sided die. Let X be a discrete random variable representing the result of a roll of the die. The probability mass function of X is

$$f(x) = \begin{cases} 0.1 & x = 1 \\ 0.1 & x = 2 \\ 0.3 & x = 3 \\ 0.3 & x = 4 \\ 0.1 & x = 5 \\ 0.1 & x = 6 \\ 0 & \text{otherwise.} \end{cases}$$

   (a) Find $F(x)$, the cumulative distribution function of X, for all $x \in (-\infty, \infty)$.

   (b) Find the expected value and the variance of X.

   (c) Suppose I roll the die ten times (all independently.) Let Y be the sum of the ten die rolls. What are the expected value and the variance of Y?

6. Let X be a random variable with probability density function

$$f(x) = \begin{cases} 2k & 0 \leq x < 3 \\ 3k & 3 \leq x < 5 \\ 0 & \text{otherwise.} \end{cases}$$

   where k is a constant.

   (a) Find k.

   (b) Find $F(4)$, the cumulative distribution function at $x = 4$.

   (c) Find the expected value of X.