Stat 2605 Tutorial 3

October 11, 2022

1. Suppose X has pmf given by

$$f(x) = \begin{cases} 0.2 & x = 1 \\ 0.3 & x = 2 \\ 0.1 & x = 3 \\ 0.4 & x = 5 \\ 0 & \text{otherwise} \end{cases}$$

   (a) Calculate $\mathbf{P}\left(X \leq 3\right)$.

   (b) Calculate $\mathbf{E}\left(X^2\right)$.

   (c) Sketch the cdf.

2. Let X be the outcome when a fair die is tossed.

   (a) Calculate $\mathbf{Var}\left(X\right)$.

   (b) Calculate $\mathbf{SD}\left(X\right)$.

3. A fair die is tossed 10 times. Let Y denote the number of times a one occurs.

   (a) Calculate the mean of Y.

   (b) Calculate the variance of Y.

   (c) Calculate the probability of observing at least four but no more than eight ones.

4. An unfair coin where $\mathbf{P}\left(H\right) = 0.6$ is repeatedly tossed. Let T be the number of tosses until a head is observed.

   (a) Calculate $\mathbf{E}\left(T\right)$.

   (b) Calculate $\mathbf{P}\left(T \geq 3\right)$.

5. When parts from an assembly line are inspected, 2% of them are found to be defective. Suppose that 100 units are tested. Find the probability that three units are defective by using a Poisson approximation.

6. Suppose X and Y are two random variables with

$$\mathbf{E}\left(X\right) = 1 \qquad \mathbf{E}\left(X^2\right) = 10$$

$$\mathbf{E}\left(Y\right) = -2$$

Let $Z = X + Y$ and $W = -2X$.

(a) Calculate $\mathbf{E}\left(Z\right)$.

(b) Calculate $\mathbf{SD}\left(W\right)$.