

ECS315 Quiz 3 Solution

Thursday, August 23, 2012
11:52 AM

Suppose a RV X has pmf

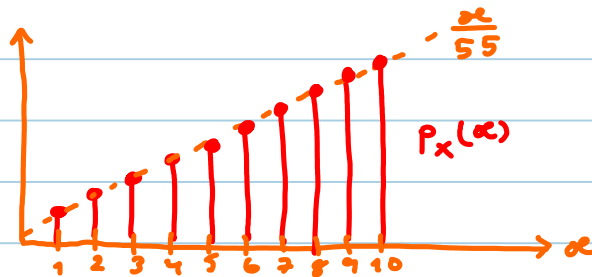
$$p_X(x) = \begin{cases} cx, & x = 1, 2, 3, \dots, 10 \\ 0, & \text{otherwise} \end{cases}$$

(a) Find c

$$\sum_x p_X(x) = 1 \Rightarrow \sum_{x=1}^{10} cx = 1$$

$$c \frac{10 \times 11}{2} = 1 \Rightarrow c = \frac{1}{55}$$

(b) Plot the pmf of X



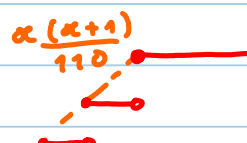
(c) Find $P[X \leq 5]$

$$P[X \leq 5] = \sum_{x=1}^5 p_X(x) = c(1+2+3+4+5) = \frac{15}{55} = \frac{3}{11}$$

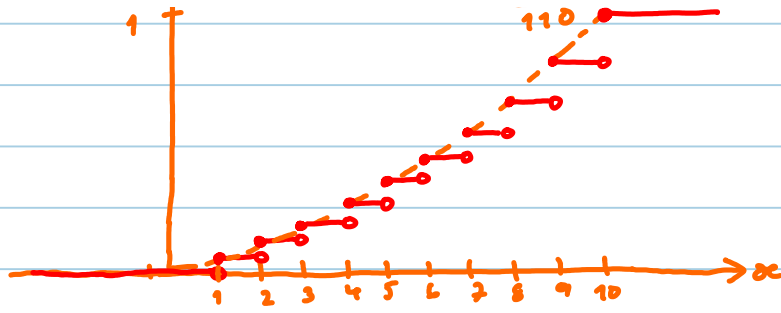
(d) * sketch $F(x) = P[X \leq x]$

For $x = 1, 2, \dots, 10$

$$F(x) = P[X \leq x] = \sum_{k=1}^x p_X(k) = \frac{x(x+1)}{2} \times c = \frac{x(x+1)}{110}$$



$$x(x+1) = x^2 + x \\ = \left(x + \frac{1}{2}\right)^2 - \frac{1}{4}$$



$$= \left(x + \frac{1}{2}\right)^2 - \frac{1}{4}$$