

# PROBABILITY

DIVYA SAI - FWC22094

**16.4.10** <sup>1</sup> The random variable  $X$  has a probability distribution  $\Pr(X)$  of the following form. Where  $k$  is some number:

$$\Pr(X) = \begin{cases} k, & \text{if } x=0 \\ 2k, & \text{if } x=1 \\ 3k, & \text{if } x=2 \\ 0, & \text{otherwise} \end{cases} \quad (16.4.10.1)$$

- a) Determine the value of  $k$   
b) Find  $\Pr(X < 2), \Pr(X \leq 2), \Pr(X \geq 2)$

**Solution:**

we know that, Sum of Probabilities = 1.

$$k + 2k + 3k = 1 \quad (16.4.10.2)$$

$$6k = 1 \quad (16.4.10.3)$$

$$k = \frac{1}{6} \quad (16.4.10.4)$$

Using CDF,

$$F_X(x) = \begin{cases} 0, & \text{if } x < 0 \\ \frac{1}{6}, & \text{if } 0 \leq x < 1 \\ \frac{1}{2}, & \text{if } 1 \leq x < 2 \\ 1, & \text{if } x \geq 2 \end{cases} \quad (16.4.10.5)$$

(a)  $\Pr(X < 2)$

$$\Pr(0 < X \leq 1) \quad (16.4.1.6)$$

$$= F(1) \quad (16.4.1.7)$$

$$= \frac{1}{2} \quad (16.4.1.8)$$

---

<sup>1</sup>Read question numbers as (CHAPTER NUMBER).(EXERCISE NUMBER).(QUESTION NUMBER)

$$\textbf{(a)} \Pr(X \leq 2)$$

$$\Pr(X \leq 2) \tag{16.4.1.9}$$

$$= F(2) \tag{16.4.1.10}$$

$$= 1 \tag{16.4.1.11}$$

$$\textbf{(a)} \Pr(X \geq 2)$$

$$\Pr(X \geq 2) \tag{16.4.1.12}$$

$$= 1 - \Pr(X < 2) \tag{16.4.1.13}$$

$$= 1 - F(1) \tag{16.4.1.14}$$

$$= 1 - \frac{1}{2} \tag{16.4.1.15}$$

$$= \frac{1}{2} \tag{16.4.1.16}$$