PROBABILITY

DIVYA SAI - FWC22094

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

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

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

Solution:

we know that, Sum of Probabilities = 1.

$$k + 2k + 3k = 1 \tag{16.4.10.2}$$

$$6k = 1 \tag{16.4.10.3}$$

$$k = \frac{1}{6} \tag{16.4.10.4}$$

Using CDF,

$$F_X(k) = \begin{cases} 0, & x < 0 \\ \frac{1}{6}, & 0 \le x < 1 \\ \frac{1}{2}, & 1 \le x < 2 \\ 1, & x \ge 2 \end{cases}$$
 (16.4.10.5)

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

$$\Pr(0 < X \le 1) = F(1) \tag{16.4.1.6}$$

$$=\frac{1}{2} \tag{16.4.1.7}$$

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

$$\Pr\left(X \le 2\right) = F(2) \tag{16.4.1.8}$$

$$=1$$
 (16.4.1.9)

¹ Read question numbers as (CHAPTER NUMBER).(EXERCISE NUMBER).(QUESTION NUMBER)

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

$$\Pr(X \ge 2) = 1 - \Pr(X < 2) \tag{16.4.1.10}$$

$$= 1 - F(1) \tag{16.4.1.11}$$

$$=1-\frac{1}{2} \tag{16.4.1.12}$$

$$\Pr(X \ge 2) = 1 - \Pr(X < 2)$$

$$= 1 - F(1)$$

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

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

$$(16.4.1.10)$$

$$(16.4.1.11)$$

$$(16.4.1.12)$$

$$(16.4.1.13)$$