

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:

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

- 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.

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

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

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

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

$$= \Pr(0) + \Pr(1) \quad (16.4.1.5)$$

$$= k + 2k \quad (16.4.1.6)$$

$$= 3k \quad (16.4.1.7)$$

$$= 3 \times \frac{1}{6} \quad (16.4.1.8)$$

$$= \frac{1}{2} \quad (16.4.1.9)$$

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

$$(b) \Pr(X \leq 2)$$

$$\Pr(X \leq 2) \tag{16.4.2.10}$$

$$= \Pr(0) + \Pr(1) + \Pr(2) \tag{16.4.2.11}$$

$$= k + 2k + 3k \tag{16.4.2.12}$$

$$= 6k \tag{16.4.2.13}$$

$$= 6 \times \frac{1}{6} \tag{16.4.2.14}$$

$$= 1 \tag{16.4.2.15}$$

$$(c) \Pr(X \geq 2)$$

$$= \Pr(2) + \Pr(3) + \dots \tag{16.4.3.16}$$

$$= 3k + 0 \tag{16.4.3.17}$$

$$= 3 \times \frac{1}{6} \tag{16.4.3.18}$$

$$= \frac{1}{2} \tag{16.4.3.19}$$