# 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:

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

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.

$$k + 2k + 3k = 1 \tag{16.4.10.2}$$
$$6k = 1 \tag{16.4.10.3}$$
$$k = \frac{1}{6} \tag{16.4.10.4}$$

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

$$= \Pr(0) + \Pr(1) \tag{16.4.1.5}$$
$$= k + 2k \tag{16.4.1.6}$$
$$= 3k \tag{16.4.1.7}$$
$$= 3 \times \frac{1}{6} \tag{16.4.1.8}$$
$$= \frac{1}{2} \tag{16.4.1.9}$$

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

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

$$= \Pr(0) + \Pr(1) + \Pr(2) \tag{16.4.2.10}$$
$$= k + 2k + 3k \tag{16.4.2.11}$$
$$= 6k \tag{16.4.2.12}$$
$$= 6 \times \frac{1}{6} \tag{16.4.2.13}$$
$$= 1 \tag{16.4.2.14}$$

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

$$= \Pr(2) + \Pr(3) + ... \tag{16.4.3.15}$$
$$= 3k + 0 \tag{16.4.3.16}$$
$$= 3 \times \frac{1}{6} \tag{16.4.3.17}$$
$$= \frac{1}{2} \tag{16.4.3.18}$$