

$x:$	0	1	2	3	4	5	6	7
$P(x):$	0	$1k$	$2k$	$2k$	$3k$	k^2	$2k^2$	$3k^2 + k$

(i) Find the value of k

(ii) Evaluate $P(X < 6)$, $P(X \geq 6)$, (iii) $P(0 < X < 5)$

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(i) If 'X' is a random variable, then

$$\sum_{i=0}^7 P(x_i) = 1,$$

$$\text{i.e., } 0 + k + 2k + 2k + 3k + k^2 + 2k^2 + 3k^2 + k = 1$$

$$7k^2 + 9k - 1 = 0$$

$$(10 - k)(k + 1) = 0$$

$$\boxed{k = 1/10}$$

(ii) $P(X < 6)$

$$= P(X=0) + P(X=1) + \dots + P(X=5)$$

$$= 0 + k + 2k + 2k + 3k + k^2$$

$$= 8k + k^2$$

$$= \frac{8}{10} + \frac{1}{100}$$

$$\boxed{P(X < 6) = \frac{.81}{100}}$$

$$P(X \geq 6) = P(X=6) + P(X=7)$$

$$= 2k^2 + 3k^2 + k = \boxed{\frac{19}{100}}$$

$$(iii) P(0 < X < 5) = P(X=1) + P(X=2) + P(X=3) + P(X=4)$$

$$= 15 + 28 + 28 + 315$$

$$= 815$$

$$= \frac{8}{10}$$

$$= \boxed{\frac{4}{5}}$$