

Assignment 1 - AI1103

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Download all python codes from
<https://github.com/Santosh-Dhaladhuli2003/AI1103-Assignment-1/blob/main/assignment1.py>

Download all latex-tikz codes from
<https://github.com/Santosh-Dhaladhuli2003/AI1103-Assignment-1/blob/main/Assignment>

1 QUESTION 5.12

A Random Variable X has the following Probability Distribution

X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k ²	2k ²	7k ² + k

Determine:

- (i) k
- (ii) $P(X < 3)$
- (iii) $P(X > 6)$
- (iv) $P(0 < X < 3)$

2 SOLUTION

(i) It is known that the sum of probabilities of a probability distribution is always one.

$$\therefore 0 + k + 2k + 3k + k^2 + 2k^2 + (7k^2 + k) = 1$$

$$\implies 10k^2 + 9k - 1 = 0$$

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

$$\implies k = -1, \frac{1}{10}$$

$$(K = -1)$$

impossible

$$\therefore k = \frac{1}{10}$$

$$(ii) P(X < 3) = P(X=2) + P(X=1) + P(X=0)$$

$$\implies P(X < 3) = 0 + k + 2k = 3k$$

$$\therefore P(X < 3) = \frac{3}{10}$$

$$(iii) P(X > 6) = P(X = 7) = 7k^2 + k$$

$$\implies P(X > 6) = \frac{7}{100} + \frac{1}{10}$$

$$\therefore P(X > 6) = \frac{17}{100}$$

$$(iv) P(0 < X < 3) = P(X = 1) + P(X = 2)$$

$$\implies P(0 < X < 3) = k + 2k$$

$$\implies P(0 < X < 3) = 3k$$

$$\therefore P(0 < X < 3) = \frac{3}{10}$$