

AI1103 : Assignment 1

Santosh Dhaladhuli - MS20BTECH11007

Download all python codes from

<https://github.com/Santosh-Dhaladhuli2003/AI1103-Assignment-1/blob/main/Assignment-1.py>

and latex codes from

<https://github.com/Santosh-Dhaladhuli2003/AI1103-Assignment-1/blob/main/Assignment%201.tex>

PROBLEM 5.12

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:

- 1) k
- 2) P(X < 3)
- 3) P(X > 6)
- 4) P(0 < X < 3)

SOLUTION

- 1) It is known that the sum of probabilities of a probability distribution is always one.

$$\therefore 0 + k + 2k + 3k + k^2 + 2k^2 + (7k^2 + k) = 1 \quad (5.12.1)$$

$$\Rightarrow 10k^2 + 9k - 1 = 0 \Rightarrow (10k - 1)(k + 1) = 0 \quad (5.12.2)$$

$$\Rightarrow k = -1, \frac{1}{10} \quad (5.12.3)$$

$$\therefore k = \frac{1}{10} (\because k \geq 0) \quad (1)$$

- 2) P(X < 3) = P(X = 2) + P(X = 1) + P(X = 0)

$$\Rightarrow P(X < 3) = 0 + k + 2k = 3k \quad (5.12.4)$$

$$\therefore P(X < 3) = \frac{3}{10} \quad (2)$$

$$3) P(X > 6) = P(X = 7) = 7k^2 + k$$

$$\Rightarrow P(X > 6) = \frac{7}{100} + \frac{1}{10} \quad (5.12.5)$$

$$\therefore P(X > 6) = \frac{17}{100} \quad (3)$$

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

$$\Rightarrow P(0 < X < 3) = k + 2k = 3k \quad (5.12.6)$$

$$\therefore P(0 < X < 3) = \frac{3}{10} \quad (4)$$

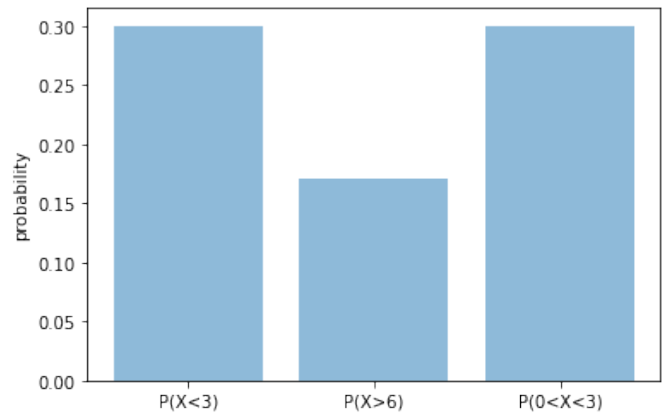


Fig. 4: Probability graph