

# Assignment-7 ( Cbse 12 ex 13.4 8 )

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# Abstract

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This document contains the solution to Cbse class 12 ex 13.48

# Problem

## Question

A random variable  $X$  has the following probability distribution:

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

Table: Probability Distribution

determine

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

# Theory

## Property required 1

The sum of all the values of  $P(X)$  should always sum upto one.

$$\sum_{i=1}^n p_i = 1, \text{ for } i = 1, 2, 3, \dots, n \quad (1)$$

## Property required 1

The value of  $P(X)$  should always be positive.

$$p_i > 0, \text{ for } i = 1, 2, 3, \dots, n \quad (2)$$

# Solution 1

determining  $k$

with help of Eq(1) , Eq(2) and based on values on Table1 we can write

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

$$\implies 10k^2 + 9k = 1 \quad (4)$$

$$\implies 10k^2 + 9k - 1 \quad (5)$$

$$\implies (10k - 1)(k + 1) \quad (6)$$

# Solution 1

## continuation of determining $k$

So  $k$  can have values  $\frac{1}{10}$ ,  $-1$  but we know based on Eq(2) that probability cannot be negative  
 $\therefore$  the value of  $k$  is 0.1

## Solution 2

finding value of  $P(X < 3)$

$$P(X < 3) = P(X = 0) + P(X = 1) + P(X = 2) \quad (7)$$

$$= 0 + k + 2k \quad (8)$$

$$= 3k \quad (9)$$

$$= 0.3 \quad (10)$$

$\therefore$  the value of  $P(X < 3)$  is 0.30

## Solution 3

finding value of  $P(X > 6)$

$$P(X > 6) = P(X = 7) \quad (11)$$

$$= 7k^2 + k \quad (12)$$

$$= 7(0.1)^2 + 0.1 \quad (13)$$

$$= 0.07 + 0.1 \quad (14)$$

$$= 0.17 \quad (15)$$

$\therefore$  the value of  $P(X > 6)$  is 0.17



## Solution 4

finding value of  $P(0 < X < 3)$

$$P(0 < X < 3) = P(X = 1) + P(X = 2) \quad (16)$$

$$= k + 2k \quad (17)$$

$$= 3k \quad (18)$$

$$= 0.3 \quad (19)$$

$\therefore$  the value of  $P(0 < X < 3)$  is 0.30