ASSIGNMENT 6 : CBSE PROBABILITY CLASS-12

AI21BTECH11016

EXAMPLE - 25

Question:
Find the probability distribution of number of doublets in three throws of a pair of dice.

Solution:
Let X=$\{0, 1, 2, 3\}$ be a random variable representing the number of doublets.

Event	Description
X = 0	no dublet in three throws
X = 1	one dublet in three throws
X = 2	two doublets in three throws
X = 3	all three throws are doublets

TABLE I

For a single throw the possible doublets are :

(1,1) , (2,2), (3,3), (4,4), (5,5), (6,6)

$\Rightarrow$ Probability of getting a doublet = $\frac{1}{6}$

From the binomial distribution :

(i)

$$\Pr\{X = 0\} = \binom{3}{0} \times \left[\frac{1}{6}\right]^0 \times \left[\frac{5}{6}\right]^3 \quad (1)$$

$$= \frac{125}{216} \quad (2)$$

(ii)

$$\Pr\{X = 1\} = \binom{3}{1} \times \left[\frac{1}{6}\right]^1 \times \left[\frac{5}{6}\right]^2 \quad (3)$$

$$= 3 \times \frac{25}{216} \quad (4)$$

$$= \frac{75}{216} \quad (5)$$

(iii)

$$\Pr\{X = 2\} = \binom{3}{2} \times \left[\frac{1}{6}\right]^2 \times \left[\frac{5}{6}\right]^1 \quad (6)$$

$$= 3 \times \frac{5}{216} \quad (7)$$

$$= \frac{15}{216} \quad (8)$$

(iv)

$$\Pr\{X = 3\} = \binom{3}{3} \times \left[\frac{1}{6}\right]^3 \times \left[\frac{5}{6}\right]^0 \quad (9)$$

$$= \frac{1}{216} \quad (10)$$

$\Rightarrow$ The Probability distribution of number of doublets in three throws of a pair of dice is :

X	0	1	2	3
P(X)	$\frac{125}{216}$	$\frac{75}{216}$	$\frac{15}{216}$	$\frac{1}{216}$

TABLE II