PROBABILITY

T SIVA PARVATHI - FWC22089

13.4.5 [1] Find the probability distribution of the number of successes in two tosses of a die, where a success is defined as

(a) number greater than 4

(b) six appears on at least one die

Solution: Given that a die tossed two times,

RV	Values	Description
X_1	{1,2,3,4,5,6}	first toss of a die
X_2	{1,2,3,4,5,6}	second toss of a die

Table 2: Random Variables(RV) X_1 and X_2

(a) number greater than 4

$$\Pr\left(X_1 > 4\right) = 1 - \Pr\left(X_1 \leq 4\right) = \frac{1}{3} \tag{13.4.1.1}$$

$$\Pr\left(X_2 > 4\right) = 1 - \Pr\left(X_2 \leq 4\right) = \frac{1}{3} \tag{13.4.1.2}$$

Probability distribution of getting number greater that 4 is,

$$\Pr\left(X_1 > 4\right) \times \Pr\left(X_2 > 4\right) = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9} \tag{13.4.1.3}$$

(b) six appears on at least one die

$$\Pr\left(X_1 \neq 6\right) = \frac{5}{6} \tag{13.4.2.4}$$

$$\Pr\left(X_2 \neq 6\right) = \frac{5}{6} \tag{13.4.2.5}$$

Probability distribution of not getting six on atleast one die is,

$$\Pr\left(X_1 \neq 6\right) \times \Pr\left(X_2 \neq 6\right) = \frac{5}{6} \times \frac{5}{6} = \frac{25}{36} \tag{13.4.2.6}$$

We know that, total probability = 1, by substracting (13.4.2.6) from total probability we get the required outcome. So, the probability distribution of getting six on atleast one die is,

$$\implies 1 - \frac{25}{36} = \frac{11}{36} \tag{13.4.2.7}$$

[1] Read question numbers as (CHAPTER NUMBER).(EXERCISE NUMBER).(QUESTION NUMBER)