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	{0,1}	0: no number > 4, 1: number > 4 for 1st toss
X_2	{0,1}	0: no number > 4, 1: number > 4 for 2nd toss
Y_1	{0,1}	0: number < 6, 1: number = 6 for 1st toss
Y_2	{0,1}	0: number < 6, 1: number = 6 for 2nd toss
Y_1Y_2	{01,10,11}	getting number 6 on atleast one die

Table 2: Random Variables(RV) X and Y

(a) number greater than 4

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

$\Pr\left(X_1 > 4\right) = 1 - \left(\Pr\left(X_1 = 1\right) + \Pr\left(X_1 = 2\right) + \Pr\left(X_1 = 3\right) + \Pr\left(X_1 = 4\right)\right)$
$\Pr\left(X_1 > 4\right) = 1 - \frac{4}{6} = \frac{1}{3}$

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

$\Pr\left(X_1 > 4\right) = 1 - \frac{4}{6} = \frac{1}{3}$
Probability distribution of two independent events, $\Pr\left(X_1 > 4\right) \times \Pr\left(X_2 > 4\right) = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$

(b) six appears on at least one die

$$\Pr\left(01, 10, 11\right) = \frac{11}{36} \tag{13.4.2.3}$$

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