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

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

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

Probability distribution of getting number greater that 4 is,

$$\Pr(X_1 > 4) \times \Pr(X_2 > 4) = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9} \tag{13.4.1.1}$$

(b) six appears on at least one die

i. $\Pr(X_1 > 5) = 1 - \Pr(X_1 \leq 5) = \frac{1}{6}$

$\Pr(X_2 \leq 5) = \frac{5}{6}$

$$\Pr(X_1 > 5) \times \Pr(X_2 \leq 5) = \frac{1}{6} \times \frac{5}{6} = \frac{5}{36} \tag{13.4.2.2}$$

ii. $\Pr(X_1 \leq 5) = \frac{5}{6}$

$\Pr(X_2 > 5) = 1 - \Pr(X_1 \leq 5) = \frac{1}{6}$

$$\Pr(X_1 \leq 5) \times \Pr(X_2 > 5) = \frac{5}{36} \tag{13.4.2.3}$$

iii. $\Pr(X_1 = 6) = \frac{1}{6}$

$\Pr(X_2 = 6) = \frac{1}{6}$

$$\Pr(X_1 = 6) \times \Pr(X_2 = 6) = \frac{1}{36} \tag{13.4.2.4}$$

Probability distribution of getting six on atleast one die $= \frac{5}{36} + \frac{5}{36} + \frac{1}{36} = \frac{11}{36}$

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