Probability and random variables assignment

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1 Q 24

Abstract—**This section provides the solution to Q24 of EX 15.1 in CBSE class 10th NCERT textbook of mathematics**

1.1. A die is thrown twice. What is the probability that:
(i) 5 will not come up either time?
(ii) 5 will come up at least once?

Solution:

Let X$\in \{1, 2, 3, 4, 5, 6\}$ be a random variable representing the number obtained on the first throw of the dice.
Similarly, Let Y$\in \{1, 2, 3, 4, 5, 6\}$ be a random variable representing the number obtained on the second throw of the dice.
For our case X is independent of Y.

TABLE 1.1.1

Random variables	Value	Probability
X/Y	1	1/6
X/Y	2	1/6
X/Y	3	1/6
X/Y	4	1/6
X/Y	5	1/6
X/Y	6	1/6

(i)
we are required to find $P((X! = 5) \cap (Y! = 5))$
we know by Baye's Theorem that:

$$P(A \cap B) = P(A|B) \times P(B) \tag{1.1.1}$$

$$\tag{1.1.2}$$

$$Let : P = P((X! = 5) \cap (Y! = 5))$$

$$\tag{1.1.3}$$

$$\implies P = P(X! = 5) \times P(Y! = 5)$$

$$\tag{1.1.4}$$

$$\implies P = (1 - P(X = 5))(1 - P(Y = 5))$$

$$\tag{1.1.5}$$

Inputting values in (1.1.4) from the table:

$$P = \left(1 - \frac{1}{6}\right)\left(1 - \frac{1}{6}\right) \tag{1.1.6}$$

$$\implies P = \frac{25}{36} \tag{1.1.7}$$

(ii)
Since the event M(say) = "not getting 5 on either throw of dice" and event N(say) = "getting atleast one 5" are exhaustive events:

$$P(M) + P(N) = 1 \tag{1.1.8}$$

$$\implies P(N) = 1 - P(M) \tag{1.1.9}$$

$$\therefore P(N) = \frac{11}{36} \tag{1.1.10}$$