

Name: Syed Tabassum nazeer

## Probability

Roll No. : FWC22093

### Problem Statement:

A die marked 1, 2, 3 in red and 4, 5, 6 in green is tossed.  
Let A be the event, 'the number is even, ' and B be the event, ' the number is red '. Are A and B independent?

### Solution:

Given, a die marked 1,2,3 in red and 4,5,6 in green is tossed.

$$S = \{1, 2, 3, 4, 5, 6\}$$

Let two events be

E : the number is even  
R : the number in red  
G : the number in green

Now, two events A and B are independent if,

$$P(A, B) = P(A).P(B)$$

$$\begin{aligned} E &= \{2, 4, 6\} \\ R &= \{1, 2, 3\} \\ G &= \{4, 5, 6\} \end{aligned}$$

$$P(E, R) = \frac{1}{6}$$

$$P(E) = \frac{3}{6} \quad (2)$$

$$P(E) = \frac{1}{2} \quad (3)$$

$$P(R) = \frac{3}{6} \quad (4)$$

$$P(R) = \frac{1}{2} \quad (5)$$

Now, for the two events A and B to be independent,

$$P(A).P(B) = P(A, B)$$

from (3) and (5)

$$P(E).P(R) = \left(\frac{1}{2}\right) \left(\frac{1}{2}\right) \quad (6)$$

$$P(E).P(R) = \frac{1}{4} \quad (7)$$

from (1) and (7), it is clear that

$$\frac{1}{6} \neq \frac{1}{4} \quad (8)$$

$$P(E, R) \neq P(E).P(R)$$

(1)  $\therefore$  Therefore, the events E and R are not independent.