

# Assignment 5

Velma Dhatri Reddy  
AI21BTECH11030

## CBSE Probability Grade 12

**Example 11:** An unbiased die is thrown twice. Let the event A be ‘odd number on the first throw’ and B the event ‘odd number on the second throw’. Check the independence of the events A and B.

**Solution:** Let the random variable  $X$  denote the numbers that appears when an unbiased die is thrown twice. The sample space is

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

(1)

Event A: Odd number on the first throw The sample space for event A is

$$A = \{(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), \\ (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), \\ (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6)\}$$

(2)

$$\Pr(X \in A) = \frac{n(x \in A)}{n(x \in S)} \quad (3)$$

$$= \frac{18}{36} \quad (4)$$

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

Event B: Odd number on the second throw The sample space for event B is

$$B = \{(1, 1), (2, 1), (3, 1), (4, 1), (5, 1), (6, 1), \\ (1, 3), (2, 3), (3, 3), (4, 3), (5, 3), (6, 3), \\ (1, 5), (2, 5), (3, 5), (4, 5), (5, 5), (6, 5)\}$$

(6)

$$\Pr(X \in B) = \frac{n(x \in B)}{n(x \in S)} \quad (7)$$

$$= \frac{18}{36} \quad (8)$$

$$= \frac{1}{2} \quad (9)$$

Two events A and B are independent if  $\Pr(X \in A \cap B) = \Pr(X \in A) \times \Pr(X \in B)$

$$A \cap B = \{(1, 1), (3, 1), (5, 1), (1, 3), (3, 3), \\ (5, 3), (1, 5), (3, 5), (5, 5)\}$$

(10)

$$\Pr(X \in A \cap B) = \frac{n(x \in A \cap B)}{n(x \in S)} \quad (11)$$

$$= \frac{9}{36} \quad (12)$$

$$= \frac{1}{4} \quad (13)$$

$$\Pr(X \in A) \times \Pr(X \in B) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4} \\ = \Pr(X \in A \cap B) \quad (14)$$

Hence, A and B are independent events.