Assignment 7

MAYURI CHOURASIA
BT21BTECH11001

Problem: Let A and B be independent events with P(A) = 0.3 and P(B) = 0.4. Find:

1) $P(A \cap B)$
2) $P(A \cup B)$
3) $P(A|B)$
4) $P(B|A)$

Solution:
Given:

1) P(A)=0.3
2) P(B)=0.4

Let us denote event A by X=0 and event B by X=1, where X is a Random Variable.
so we have,

$$P(X = 0) = 0.3 \tag{1}$$
$$P(X = 1) = 0.4 \tag{2}$$

1)

$$P(X = 0 \cap X = 1) = P(X = 0) \times P(X = 1) \tag{3}$$
$$= 0.3 \times 0.4 \tag{4}$$
$$= 0.12 \tag{5}$$

2)

$$P(X = 0 \cup X = 1) = P(X = 0) + P(X = 1) - P(X = 0 \cup X = 1) \tag{6}$$
$$= 0.3 + 0.4 - 0.12 \tag{7}$$
$$= 0.58 \tag{8}$$

3)

$$P(X = 0|X = 1) = \frac{P(X = 0 \cap X = 1)}{P(X = 1)} \tag{9}$$
$$= \frac{0.12}{0.4} \tag{10}$$
$$= 0.3 \tag{11}$$

4)

$$P(X = 1|X = 0) = \frac{P(X = 0 \cap X = 1)}{P(X = 0)} \tag{12}$$
$$= \frac{0.12}{0.3} \tag{13}$$
$$= 0.4 \tag{14}$$