Probability Assignment

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12.13.1.5
If P(A)=$\frac{6}{11}$, $P(B) = \frac{5}{11}$ and P(A+B)=$\frac{7}{11}$, find
(i) P(A.B) (ii)P($A \mid B$) (iii)P($B \mid A$)

Solution

(i) We know that,

$$P(A.B) = P(A) + P(B) - P(A + B) \tag{1}$$

From (1), we get

$$P(A.B) = \frac{6}{11} + \frac{5}{11} - \frac{7}{11}$$
$$P(A.B) = \frac{4}{11}$$

(ii), We know that,

$$P(A \mid B) = \frac{P(A.B)}{P(B)} \tag{2}$$

From (2), we get

$$P(A \mid B) = \frac{\frac{4}{11}}{\frac{5}{11}}$$
$$P(A \mid B) = \frac{4}{5}$$

(iii), We know that,

$$P(B \mid A) = \frac{P(B.A)}{P(A)} \tag{3}$$

From (3), we get

$$P(B \mid A) = \frac{\frac{4}{11}}{\frac{6}{11}}$$
$$P(B \mid A) = \frac{4}{6}$$
$$P(B \mid A) = \frac{2}{3}$$

As a result,

$$P(A.B) = \frac{4}{11}$$
$$P(A \mid B) = \frac{4}{5}$$
$$P(B \mid A) = \frac{2}{3}$$