

# Probability Assignment

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## 12.13.1.5

If  $\Pr(A) = \frac{6}{11}$ ,  $\Pr(B) = \frac{5}{11}$  and  $\Pr(A + B) = \frac{7}{11}$ , find

1.  $\Pr(AB)$
2.  $\Pr(A | B)$
3.  $\Pr(B | A)$

## Solution

1. We know that,

$$\Pr(AB) = \Pr(A) + \Pr(B) - \Pr(A + B) \quad (1)$$

From (1), we get

$$\Pr(AB) = \frac{6}{11} + \frac{5}{11} - \frac{7}{11} \quad (2)$$

$$\Pr(AB) = \frac{4}{11} \quad (3)$$

2. We know that,

$$\Pr(A | B) = \frac{\Pr(AB)}{\Pr(B)} \quad (4)$$

From (4), we get

$$\Pr(A | B) = \frac{\frac{4}{11}}{\frac{5}{11}} \quad (5)$$

$$\Pr(A | B) = \frac{4}{5} \quad (6)$$

3. We know that,

$$\Pr(B | A) = \frac{\Pr(BA)}{\Pr(A)} \quad (7)$$

From (7), we get

$$\Pr(B | A) = \frac{\frac{4}{11}}{\frac{6}{11}} \quad (8)$$

$$\Pr(B | A) = \frac{4}{6} \quad (9)$$

$$\Pr(B | A) = \frac{2}{3} \quad (10)$$

As a result,

$$\Pr(AB) = \frac{4}{11} \quad (11)$$

$$\Pr(A | B) = \frac{4}{5} \quad (12)$$

$$\Pr(B | A) = \frac{2}{3} \quad (13)$$