

# Probability Assignment 1

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**Question :** Given two independent events A and B such that  $\Pr(A) = 0.3$ ,  $\Pr(B) = 0.6$ . Find

- 1)  $\Pr(AB)$
- 2)  $\Pr(AB')$
- 3)  $\Pr(A + B)$
- 4)  $\Pr(A'B')$

**Solution :** Given  $\Pr(A) = 0.3$ ,  $\Pr(B) = 0.6$ .

- 1)  $\Pr(AB)$  : As A and B are independent events.

$$\begin{aligned}\implies \Pr(AB) &= \Pr(A) \times \Pr(B) \quad (1) \\ &= 0.3 \times 0.6 \\ &= 0.18\end{aligned}$$

- 2)  $\Pr(AB')$  : We know that,

$$B + B' = 1 \quad (2)$$

Hence,

$$\implies \Pr(B + B') = 1 \quad (3)$$

$$\implies \Pr(B) + \Pr(B') = 1 \quad (4)$$

$$\begin{aligned}\implies \Pr(B') &= 1 - \Pr(B) \quad (5) \\ &= 1 - 0.6 \\ &= 0.4\end{aligned}$$

Since A and B are independent,

$$\begin{aligned}\implies \Pr(AB') &= \Pr(A) \times \Pr(B') \quad (6) \\ &= 0.3 \times 0.4 \\ &= 0.12\end{aligned}$$

- 3)  $\Pr(A + B)$  : As we know,

$$\begin{aligned}\Pr(A + B) &= \Pr(A) + \Pr(B) - \Pr(AB) \quad (7) \\ &= 0.3 + 0.6 - 0.18 \\ &= 0.72\end{aligned}$$

- 4)  $\Pr(A'B')$  : As we know,

$$A'B' = (A + B)' \quad (8)$$

Therefore,

$$\begin{aligned}\implies \Pr(A'B') &= \Pr((A + B)') \quad (9) \\ &= 1 - \Pr(A + B) \\ &= 1 - 0.72 \\ &= 0.28\end{aligned}$$