

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) $\Pr(A \text{ and } B)$
- 2) $\Pr(A \text{ and not } B)$
- 3) $\Pr(A \text{ or } B)$
- 4) $\Pr(\text{neither } A \text{ nor } B)$

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

- 1) $\Pr(A \text{ and } B)$ As A and B are independent events.

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

- 2) $\Pr(A \text{ and not } B)$

$$\begin{aligned}\Pr(A \text{ and not } B) &= \Pr(AB') \quad (2) \\ &= 0.3 \times (1 - 0.6) \\ &= 0.12\end{aligned}$$

- 3) $\Pr(A \text{ or } B)$

$$\Pr(A \text{ or } B) = \Pr(A + B) \quad (3)$$

As we know,

$$\Pr(A + B) = \Pr(AB') + \Pr(A'B) + \Pr(AB) \quad (4)$$

$$\begin{aligned}\Pr(A + B) &= (0.3) \times (1 - 0.6) + (1 - 0.3)(0.6) + (0.3)(0.6) \\ \Pr(A + B) &= 0.72\end{aligned}$$

- 4) $\Pr(\text{neither } A \text{ nor } B)$

$$\Pr(\text{neither } A \text{ nor } B) = \Pr(A'B') \quad (5)$$

$$\text{As, } A'B' = (A + B)' \quad (6)$$

$$\begin{aligned}\Pr(\text{neither } A \text{ nor } B) &= \Pr(A') \times \Pr(B') \quad (7) \\ &= (1 - 0.3) \times (1 - 0.6) \\ &= 0.28\end{aligned}$$