

Assignment 1

AI1110: Probability and Random Variables

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PROBLEM 12.13.2.8

8. Let A and B be independent events with $\Pr(A) = 0.3$ and $\Pr(B) = 0.4$. Find

- i) $\Pr(AB)$
- ii) $\Pr(A + B)$
- iii) $\Pr(A|B)$
- iv) $\Pr(B|A)$

SOLUTION:

Given, $\Pr(A) = 0.3$, $\Pr(B) = 0.4$ and A, B are independent events.

- i) $\Pr(AB)$

$$\Pr(AB) = \Pr(A) \times \Pr(B) = 0.3 \times 0.4 = 0.12 \quad (1)$$

- ii) $\Pr(A + B)$

We know that,

$$\Pr(A + B) = \Pr(A) + \Pr(B) - \Pr(AB) \quad (2)$$

$$\Pr(A + B) = 0.3 + 0.4 - 0.12 = 0.58 \quad (3)$$

- iii) $\Pr(A|B)$

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

$$\Pr(A|B) = \frac{\Pr(A) \times \Pr(B)}{\Pr(B)} = \Pr(A) = 0.3 \quad (5)$$

- iv) $\Pr(B|A)$

$$\Pr(B|A) = \frac{\Pr(AB)}{\Pr(A)} = \frac{\Pr(B) \times \Pr(A)}{\Pr(A)} = \Pr(B) = 0.4 \quad (6)$$