

Assignment 1

AI1110 : Probability and Random Variables
Indian Institute of Technology Hyderabad

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Problem 11.16.4.7 : A and B are two events such that $\Pr(A) = 0.54$, $\Pr(B) = 0.69$ and $\Pr(AB) = 0.35$. Find

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

Solution:

Given,

$$\Pr(A) = 0.54 \quad (1)$$

$$\Pr(B) = 0.69 \quad (2)$$

$$\Pr(AB) = 0.35 \quad (3)$$

- 1) We know that,

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

$$\Pr(A + B) = 0.54 + 0.69 - 0.35$$

$$\therefore \Pr(A + B) = 0.88.$$

- 2) By **De Morgan's law**,

$$A'B' = (A + B)'$$

$$\Pr(A'B') = \Pr((A + B)')$$

$$\Pr(A'B') = 1 - \Pr(A + B)$$

$$\therefore \Pr(A'B') = 1 - 0.88 = 0.12$$

- 3) We know that,

$$A = AB + AB'$$

$$AB' = A - AB$$

$$\Pr(AB') = \Pr(A) - \Pr(AB)$$

$$\Pr(AB') = 0.54 - 0.35$$

$$\therefore \Pr(AB') = 0.19$$

- 4) We know that,

$$\Pr(BA') = \Pr(B) - \Pr(AB)$$

$$\Pr(BA') = 0.69 - 0.35$$

$$\therefore \Pr(BA') = 0.34.$$

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