

# Probability Assignment -I

Posa Harsha vardhan(EE22BTECH11214)\*

## Problem:

- 1) Probability of solving specific problem independently by A and B are  $\frac{1}{2}$  and  $\frac{1}{3}$  respectively. If both try to solve problem independently, find the probability that
- Problem is solved
  - exactly one of them solves the problem

## Solution:

- Given that  $\Pr(A) = \frac{1}{2}$  and  $\Pr(B) = \frac{1}{3}$
- A,B are independent so

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

- The problem will be solved if either of them solves it or both solves it, i.e  $\Pr(A + B)$

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

$$= \Pr(A) + \Pr(B) - \Pr(A) \Pr(B) \quad (3)$$

$$= \frac{1}{2} + \frac{1}{3} - \frac{1}{6} = \frac{2}{3} \quad (4)$$

$$\therefore \Pr(A + B) = \frac{2}{3} \quad (5)$$

- Probability of A not solving problem is  $\Pr(A')$

$$= 1 - \Pr(A) = 1 - \frac{1}{2} = \frac{1}{2} \quad (6)$$

- Probability of B not solving problem is  $\Pr(B')$

$$= 1 - \Pr(B) = 1 - \frac{1}{3} = \frac{2}{3} \quad (7)$$

- Probability that exactly one person solves problem is

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

$$= \Pr(A) \Pr(B') + \Pr(A') \Pr(B) \quad (9)$$

$$= \frac{1}{2} \cdot \frac{2}{3} + \frac{1}{2} \cdot \frac{1}{3} = \frac{1}{2} \quad (10)$$

$$\therefore \Pr(AB') + \Pr(A'B) = \frac{1}{2} \quad (11)$$