

# AI 1103 - Assignment 3

T. Rohan  
CS20BTECH11064

Download all python codes from

[https://github.com/rohanthota/Assignment\\_3/codes/Assignment\\_3.py](https://github.com/rohanthota/Assignment_3/codes/Assignment_3.py)

and latex codes from

[https://github.com/rohanthota/Assignment\\_3/Assignment\\_3.tex](https://github.com/rohanthota/Assignment_3/Assignment_3.tex)

## Question

You have gone to a cyber-café with a friend. You found that the cyber-café has only three terminals. All terminals are unoccupied. You and your friend have to make a random choice of selecting a terminal. What is the probability that both of you will NOT select the same terminal?

## Solution

There are three terminals. Each terminal has an equal probability of  $\frac{1}{3}$  to be picked.

Defining random variables  $X_1, X_2 \in \{0, 1, 2\}$

Where,

$X_i = 0$  when  $i$ th man picks first terminal.

$X_i = 1$  when  $i$ th man picks second terminal.

$X_i = 2$  when  $i$ th man picks third terminal.

The events of choosing same table and choosing different table are complementary.

$$\Pr(X_1 = X_2) + \Pr(X_1 \neq X_2) = 1. \quad (0.0.1)$$

$$\Pr(X_1 \neq X_2) = 1 - \Pr(X_1 = X_2). \quad (0.0.2)$$

Considering  $\Pr(X_1 = X_2)$

It is done when one terminal is chosen and then, both of them choose the same terminal

$$\Rightarrow \Pr(X_1 = X_2) = \sum_{j=1}^3 \Pr(X_1 = X_2 = j) \quad (0.0.3)$$

$$\Rightarrow \Pr(X_1 = X_2) = \frac{1}{3} \times \frac{1}{3} + \frac{1}{3} \times \frac{1}{3} + \frac{1}{3} \times \frac{1}{3}. \quad (0.0.4)$$

$$\therefore \Pr(X_1 = X_2) = \frac{1}{3} \quad (0.0.5)$$

$$\Rightarrow \Pr(X_1 \neq X_2) = 1 - \frac{1}{3}. \quad (0.0.6)$$

$$\therefore \Pr(X_1 \neq X_2) = \frac{2}{3}. \quad (0.0.7)$$