

# ASSIGNMENT-12

Unnati Gupta

Download all python codes from

[https://github.com/unnatigupta2320/  
Assignment\\_12/blob/master/codes.py](https://github.com/unnatigupta2320/Assignment_12/blob/master/codes.py)

and latex-tikz codes from

[https://github.com/unnatigupta2320/  
Assignment\\_12](https://github.com/unnatigupta2320/Assignment_12)

## 1 QUESTION No. 2.8

Two groups are competing for the position on the Board of directors of a corporation. The probabilities that first and second group will win are 0.6 and 0.4 respectively. Further if the first group wins, the probability of introducing a new product is 0.7 and the corresponding probability is 0.3 if the second group wins. Find the probability that the new product is introduced by the second group.

## 2 SOLUTION

- Let  $X$  and  $Y$  be the input variables which can be referred from the table 2.1:-

X	X=1 : New product is introduced
	X=0 : No New product
Y	Y=1 : First group wins
	Y=0 : Second group wins

TABLE 2.1: Assumed Variables

- Furthermore, Data given is tabularised in the table 2.2 :-

	Expression	Value
a.)	$\Pr(Y=1)$	0.6
b.)	$\Pr(Y=0)$	0.4
c.)	$\Pr(X = 1 Y = 1)$	0.7
d.)	$\Pr(X = 1 Y = 0)$	0.3

TABLE 2.2: Data Given

- So, the probability that new product is introduced by the second group can be given using **Baye's Theorem** as:-

$$\Pr(Y = 0|X = 1) = \frac{\Pr(X = 1|Y = 0)\Pr(Y = 0)}{\sum_{i=0}^1 \Pr(X = 1|Y = i)\Pr(Y = i)} \quad (2.0.1)$$

$$= \frac{0.3 \times 0.4}{0.3 \times 0.4 + 0.7 \times 0.6} \quad (2.0.2)$$

$$= \frac{0.12}{0.54} = \frac{2}{9} \quad (2.0.3)$$

$$\therefore \Pr(Y = 0|X = 1) = \frac{2}{9} \quad (2.0.4)$$