

# Assignment 1

## AI1110: Probability and Random Variables

Ch.Kushwanth  
AI22BTECH11006

**12.13.6.15 : Question.** An electronic assembly consists of two subsystems, say A and B. From previous testing procedures, the following probabilities are assumed to be known:

$$\Pr(A \text{ fails}) = 0.20$$

$$\Pr(B \text{ alone fails}) = 0.15$$

$$\Pr(A \text{ and } B \text{ fails}) = 0.15$$

Evaluate the following probabilities

(i)  $\Pr(A \text{ fails given } B \text{ has failed})$

(ii)  $\Pr(A \text{ fails alone})$

**ans:**

$$\Pr(A \text{ fails given } B \text{ has failed}) = 0.50$$

$$\Pr(A \text{ fails alone}) = 0.05$$

**Solution:**

Given in question,

Probability that A fails  $\Pr(A') = 0.20$

Probability that B fails alone  $\Pr(AB') = 0.15$

Probability that both A and B fail  $\Pr(A'B') = 0.15$

Now to find,

Probability that both A fails given B has failed

$\Pr(A'|B')$  and Probability that A fails alone  $\Pr(BA')$

To obtain  $\Pr(A'|B')$

we know that,

$$\Pr(A'|B') = \Pr(A'B') / \Pr(B') \quad (1)$$

to obtain  $\Pr(B')$

we know that,

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

$$= 0.15 + 0.15 \quad (3)$$

$$\Pr(B') = 0.30 \quad (4)$$

now to find  $\Pr(A'|B')$

$$\Pr(A'|B') = 0.15/0.30 \quad (5)$$

$$\Pr(A'|B') = 0.50 \quad (6)$$

similarly,

To obtain  $\Pr(BA')$  we have to use  $\Pr(A'B')$  and  $\Pr(A')$  we know that,

$$\Pr(BA') = \Pr(A') - \Pr(A'B') \quad (7)$$

$$= 0.20 - 0.15 \quad (8)$$

$$\Pr(BA') = 0.05 \quad (9)$$