

# Assignment 1

## Probability And Random Processes

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**12.13.6.18: Question.** If  $\Pr(A|B) > \Pr(A)$ , then (D) from equation (6) we have which of the following is correct :

$$\Pr(B|A) > \Pr(B) \quad (9)$$

(A)  $\Pr(B|A) < \Pr(B)$

but given  $\Pr(B|A) = \Pr(B)$

(B)  $\Pr(AB) < \Pr(A)\Pr(B)$

Therefore, option (D) is incorrect

(C)  $\Pr(B|A) > \Pr(B)$

(D)  $\Pr(B|A) = \Pr(B)$

**Solution:** We know:

$$\Pr(A|B) > \Pr(A) \quad (1)$$

$$\implies \frac{\Pr(AB)}{\Pr(B)} > \Pr(A) \quad (2)$$

$$\implies \Pr(AB) > \Pr(A)\Pr(B) \quad (3)$$

(A) To find,  $\Pr(B|A)$

$$\Pr(B|A) = \frac{\Pr(AB)}{\Pr(A)} \quad (4)$$

Dividing  $\Pr(A)$  on both sides of equation ((1))

$$\implies \frac{\Pr(AB)}{\Pr(A)} > \frac{\Pr(A)\Pr(B)}{\Pr(A)} \quad (5)$$

$$\implies \Pr(B|A) > \Pr(B) \quad (6)$$

But given  $\Pr(B|A) < \Pr(B)$  so option (A) is incorrect

(B) from equation (3) we have

$$\Pr(AB) > \Pr(A)\Pr(B) \quad (7)$$

Therefore, option (B) is incorrect

(C) from equation (3) we have

$$\Pr(B|A) > \Pr(B) \quad (8)$$

which matches the given option

Therefore, option (C) is correct