

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 (2) we have which of the following is correct :

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

- (A) $\Pr(B|A) < \Pr(B)$
- (B) $\Pr(AB) < \Pr(A)\Pr(B)$
- (C) $\Pr(B|A) > \Pr(B)$
- (D) $\Pr(B|A) = \Pr(B)$

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

Therefore, option (D) is incorrect

Answer: (C) $\Pr(B|A) > \Pr(B)$.

Solution: We know:

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

$$= \frac{\Pr(AB)}{\Pr(B)} > \Pr(A)$$

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

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

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

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

$$= \frac{\Pr(AB)}{\Pr(A)} > \frac{\Pr(A)\Pr(B)}{\Pr(A)}$$

$$= \Pr(B|A) > \Pr(B) \quad (2)$$

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

(B) from equation (1) we have

$$= \Pr(AB) > \Pr(A)\Pr(B)$$

Therefore, option (B) is incorrect

(C) from equation (2) we have

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

which matches the given option

Therefore, option (C) is correct