# Assignment 1
# Probability And Random Processes

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**12.13.6.18: Question**. If $\Pr(A|B) > \Pr(A)$, then which of the following is correct :

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

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

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

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

**Answer: (C)** $\Pr(B|A) > \Pr(B)$.
**Solution:** We know:

$$\Pr(A|B) > \Pr(A) \tag{1}$$

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

$$\implies \Pr(AB) > \Pr(A)\Pr(B) \tag{3}$$

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

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

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

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

$$\implies \Pr(B|A) > \Pr(B) \tag{6}$$

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

(B) from equation (3) we have

$$\Pr(AB) > \Pr(A)\Pr(B) \tag{7}$$

Therefore, option (B) is incorrect

(C) from equation (3) we have

$$\Pr(B|A) > \Pr(B) \tag{8}$$

which matches the given option
Therefore, option (C) is correct

(D) from equation (6) we have

$$\Pr(B|A) > \Pr(B) \tag{9}$$

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

Therefore, option (D) is incorrect