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:

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

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

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

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

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

Dividing $\Pr(A)$ on both sides of (**??**)

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

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

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

(B) from equation (**??**) we have

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

Therefore, option (B) is incorrect

(C) from equation (**??**) we have

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

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

(D) from equation (**??**) we have

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

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

Therefore, option (D) is incorrect