Assignment:- 1

AI1110: Probability and Random Variables
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Question: If $Pr(A|B) > Pr(A)$, then which of the following is correct?

(A) $Pr(B|A) < Pr(B)$ (B) $Pr(A \cap B) < Pr(A) \cdot Pr(B)$
(C) $Pr(B|A) > Pr(B)$ (D) $Pr(B|A) = Pr(B)$

Solution: We can write the given condition as:

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

Multiplying both sides by $\Pr(B)$, we get:

$$\Pr(A \cap B) > \Pr(A) \cdot \Pr(B)$$

Dividing both sides by $\Pr(A)$, we get:

$$\begin{aligned} &\frac{\Pr(A \cap B)}{\Pr(A)} > \Pr(B) \\ \implies &\Pr(B|A) = \frac{\Pr(A \cap B)}{\Pr(A)} > \Pr(B) \\ \implies &\Pr(B|A) > \Pr(B) \end{aligned}$$

This is equivalent to option (C), so (C) is correct.