Assignment:- 1

AI1110: Probability and Random Variables
Indian Institute of Technology, Hyderabad

Dudekula Dheeraj
CS22BTECH11019

NCERT(12.13.6.18)

Question: If $P(A|B) > P(A)$, then which of the following is correct?

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

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:

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

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