Assignment 1
AI1110: Probability and Random Variables
Indian Institute of Techonology Hyderabad

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

$$(\textbf{A})P(B \mid A) < P(B) \qquad (\textbf{B})P(A \cap B) < P(A).P(B)$$

$$(\textbf{C})P(B \mid A) > P(B) \qquad (\textbf{D})P(B \mid A) = P(B)$$

Answer:(C) $P(B \mid A) > P(B)$**.**

Solution: Given:

$$P(A \mid B) > P(A)$$
$$\Rightarrow \frac{P(A \cap B)}{P(B)} > P(A)$$
$$\Rightarrow P(A \cap B) > P(A).P(B)$$
$$\Rightarrow \frac{P(A \cap B)}{P(A)} > P(B) \qquad\qquad\qquad -(1)$$

We know:

$$P(B \mid A) = \frac{P(A \cap B)}{P(A)}$$

from(1),

$$\Rightarrow P(B \mid A) > P(B) \qquad \textbf{i.e.} \quad (\textbf{C})$$