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Assignment 1

AI1110: Probability and Random Variables Indian Institute of Technology Hyderabad

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

- (A) $Pr(B \mid A) < Pr((B))$
- (B) Pr(AB) < Pr(A) Pr(B)
- (C) $Pr(B \mid A) > Pr(B)$
- (D) $Pr(B \mid A) = Pr(B)$

Answer: (C) $Pr(B \mid A) > Pr(B)$

Solution: Given:

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

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

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

$$\implies \frac{\Pr(AB)}{\Pr(A)} > \Pr(B) \tag{4}$$

We know:

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

from(4),

$$\implies \Pr(B \mid A) > \Pr(B) \dots \mathbf{i.e.}(C)$$
(6)

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