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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:

- 1) Pr(B | A) < Pr((B))
- 2) Pr(AB) < Pr(A) Pr(B)
- 3) Pr(B | A) > Pr(B)
- 4) $Pr(B \mid A) = Pr(B)$

Answer: (3) Pr(B | 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:

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

from (4),

$$\implies \Pr(B \mid A) > \Pr(B) \dots \mathbf{i.e.(3)}$$

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