

Assignment 1

AI1110: Probability and Random Variables
Indian Institute of Technology Hyderabad

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12.13.6.18: Question. If $\Pr(A | B) > \Pr(A)$, 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) $\Pr(B | A) = \Pr(B)$

Answer: (3) $\Pr(B | A) > \Pr(B)$

Solution: Given:

$$\Pr(A | B) > \Pr(A) \quad (1)$$

$$\Rightarrow \frac{\Pr(AB)}{\Pr(B)} > \Pr(A) \quad (2)$$

$$\Rightarrow \Pr(AB) > \Pr(A) \Pr(B) \quad (3)$$

$$\Rightarrow \frac{\Pr(AB)}{\Pr(A)} > \Pr(B) \quad (4)$$

We know:

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

from (4) ,

$$\Rightarrow \Pr(B | A) > \Pr(B) \dots\dots\dots \text{i.e. (3)} \quad (6)$$