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

Yasir Usmani*

AI22BTECH11031

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

Solution: Given:

$$\Pr(A \mid B) > \Pr(A)$$

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

$$\implies \Pr(AB) > \Pr(A).\Pr(B)$$

$$\implies \frac{\Pr(AB)}{\Pr(A)} > \Pr(B) \tag{1}$$

We know:

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

from(1),

$$\implies \Pr(B \mid A) > \Pr(B) \text{...............}\textbf{i.e.(C)}$$

*The student is with the Department of Artificial Intelligence, Indian Institute of Technology, Hyderabad, 502285, India.
e-mail: ai22btech11031@iith.ac.in.