## **Assignment 1**

**AI1110**: Probability and Random Variables Indian Institute of Technology Hyderabad

Yasir Usmani\* AI22BTECH11031

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

$$(\mathbf{A})\Pr\left((B\mid A)\right) < \Pr\left((B)\right)$$

$$(\mathbf{B}) \Pr(AB) < \Pr(A) \cdot \Pr(B)$$

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

**(D)** 
$$Pr(B \mid A) = Pr(B)$$

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

**Solution**: Given:

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

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

$$\Rightarrow \Pr(AB) > \Pr(A) \cdot \Pr(B)$$

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

We know:

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

from(1),

$$\implies \Pr(B \mid A) > \Pr(B) \dots i.e.(C)$$

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