

# Assignment 1

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

Arsh Srivastava  
AI22BTECH11003

## Question 12.13.3.14 :

If A and B are two events such that  $A \subset B$  and  $\Pr(B) \neq 0$ , then which of the following is correct?

### Options:

- 1)  $\Pr(A | B) = \frac{\Pr(B)}{\Pr(A)}$
- 2)  $\Pr(A | B) < \Pr(A)$
- 3)  $\Pr(A | B) \geq \Pr(A)$
- 4) None of these

**Answer: (3)**

**Solution:**

As given in the question,

$$A \subset B \Rightarrow AB = A \quad (1)$$

$$\therefore \Pr(A | B) = \frac{\Pr(AB)}{\Pr(B)} \quad (2)$$

$$\Rightarrow \Pr(A|B) = \frac{\Pr(A)}{\Pr(B)} \quad (3)$$

$$\Pr(B) \neq 0 \quad (4)$$

Equation (4) is given in the question

$$\Rightarrow 0 < \Pr(B) \leq 1 \quad (5)$$

$$\Rightarrow \frac{1}{\Pr(B)} \geq 1 \quad (6)$$

$\therefore$  Using (1) ,

$$\Pr(A|B) = \Pr(A) \times \frac{1}{\Pr(B)} \geq \Pr(A) \quad (7)$$

$$\therefore \Pr(A | B) \geq \Pr(A) \quad (8)$$

Hence, the correct option is (3).