Assignment 1

AI1110: Probability and Random Variables
Indian Institute of Techonology Hyderabad

Arsh Srivastava
AI22BTECH11003

Question 12.13.3.14 : If A and B are two events such that
A ⊂ B and P(B) ≠ 0, then which of the following is correct?

Options:
(A)$P(A \mid B) = \frac{P(B)}{P(A)}$
(B)$P(A \mid B) < P(A)$
(C)$P(A \mid B) \geq P(A)$
(D)None of these

Answer: (C)

Solution:
As given in the question $A \subset B \Rightarrow A \cap B = A$
$\therefore P(A \mid B) = \frac{P(A \cap B)}{P(B)} = \frac{P(A)}{P(B)}$ ...(i)
Since, $P(B) \neq 0$
$\therefore 0 < P(B) \leq 1 \Rightarrow \frac{1}{P(B)}$
$\therefore$ Using equation (i) , $P(A|B) = P(A) \times \frac{1}{P(B)} \geq P(A)$
Hence, the correct option is (C).