

Assignment 1

AI1110: Probability and Random Variables
Indian Institute of Technology Hyderabad

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Question 12.13.3.14 :

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

Options :

$$(A) P(A | B) = \frac{P(B)}{P(A)}$$

$$(B) P(A | B) < P(A)$$

$$(C) P(A | B) \geq P(A)$$

$$(D) \text{None of these}$$

Answer: (C)

Solution:

As given in the question $A \subset B \Rightarrow AB = A$

$$\therefore P(A | B) = \frac{P(A \cap B)}{P(B)} = \frac{P(A)}{P(B)} \quad \dots(i)$$

Since, $P(B) \neq 0$

$$\therefore 0 < P(B) \leq 1 \Rightarrow \frac{1}{P(B)}$$

$$\therefore \text{Using equation (i) , } P(A|B) = P(A) \times \frac{1}{P(B)} \geq P(A)$$

Hence, the correct option is (C).