Probability Assignment

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I. PROBLEM2

If A and B are events such that $P(\frac{A}{B}) = P(\frac{B}{A})$, then

(A) $A \subset B$ but $A \neq B$
(B) $A = B$
(C) $A \cap B = \phi$
(D) $P(A) = P(B)$

II. SOLUTION

Given, $P(\frac{A}{B}) = P(\frac{B}{A})$

$$\implies \frac{P(AB)}{P(B)} = \frac{P(BA)}{P(A)}$$

$$\implies \frac{P(AB)}{P(B)} = \frac{P(AB)}{P(A)} \text{ (Since } P(AB) = P(BA))$$

$$\implies \frac{1}{P(B)} = \frac{1}{P(A)}$$

$$\therefore P(A) = P(B)$$