

Assignment: Probability

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13.1.17 If A and B are events such that $\Pr(A|B) = \Pr(B|A)$, then

(a) $A \subset B$ but $A \neq B$

(b) $A = B$

(c) $A \cap B = \phi$

(d) $\Pr(A) = \Pr(B)$

Solution:

$$\text{Given, } \Pr(A|B) = \Pr(B|A) \quad (13.1.4.1)$$

$$\implies \frac{\Pr(AB)}{\Pr(B)} = \frac{\Pr(BA)}{\Pr(A)} \quad (13.1.4.2)$$

$$\implies \frac{\Pr(AB)}{\Pr(B)} = \frac{\Pr(AB)}{\Pr(A)} (\because \Pr(AB) = \Pr(BA)) \quad (13.1.4.3)$$

$$\implies \frac{1}{\Pr(B)} = \frac{1}{\Pr(A)} \quad (13.1.4.4)$$

$$\therefore \Pr(A) = \Pr(B) \quad (13.1.4.5)$$