

12.13.3.62

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If A and B are two events and $A \neq \phi$, $B \neq \phi$,
then

$$1) \Pr(A|B) = \frac{\Pr(A \cap B)}{\Pr(B)}$$

$$2) \Pr(A|B) = \frac{\Pr(A \cap B)}{\Pr(B)}$$

$$3) \Pr(A|B) \cdot \Pr(B|A) = 1$$

$$4) \Pr(A|B) = \frac{\Pr(A)}{\Pr(B)}$$

Solution:

$$\Pr(A|B) = \frac{\Pr(A \cdot B)}{\Pr(B)} \quad (1)$$

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

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

$$\Rightarrow = \frac{\Pr(A \cdot B)^2}{\Pr(A) \cdot \Pr(B)} \quad (4)$$

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