12.13.3.62

Rambha Satvik*

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

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

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

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

$$\implies \Pr(A|B) \cdot \Pr(B|A) = \frac{\Pr(A.B)}{\Pr(B)} . \frac{\Pr(A.B)}{\Pr(A)} \tag{3}$$

$$\implies = \frac{\Pr(A.B)^2}{\Pr(A) \cdot \Pr(B)} \tag{4}$$

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