Assignment: Probability

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13.1.17 [1]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 = ϕ

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

Solution:

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

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

$$\implies \frac{\Pr(AB)}{\Pr(B)} = \frac{\Pr(AB)}{\Pr(A)} (\text{Since}, \Pr(AB) = \Pr(BA)) \tag{13.1.4.3}$$

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

$$\therefore \Pr(A) = \Pr(B) \tag{13.1.4.5}$$

[1]Read question numbers as (CHAPTER NUMBER).(EXERCISE NUMBER).(QUESTION NUMBER)