Answer on Question #46077 –Math – Statistics and Probability

Problem.

Bag A contains 2 White and 4 Black balls. Another bag B contains 5 white and 7 black balls. A ball is transformed from the bag A to the bag B. Then a ball is drawn from the bag B. Find the probability that it is Black.

Solution:

Let X, Y are events: X ="the black ball was taken from the bag A", Y =" the black ball will be taken from the bag B". Hence

$$P(X) = \frac{4}{2+4} = \frac{2}{3} \text{ and } P(X^c) = 1 - P(X) = 1 - \frac{2}{3} = \frac{1}{3},$$

$$P(Y|X) = \frac{7+1}{5+(7+1)} = \frac{8}{13} \text{ and } P(Y|X^c) = \frac{5+1}{(5+1)+7} = \frac{6}{13}.$$

Therefore

$$P(Y) = P(Y|X)P(X) + P(Y|X^c)P(X^c) = \frac{2}{3} \cdot \frac{8}{13} + \frac{1}{3} \cdot \frac{6}{13} = \frac{16+6}{39} = \frac{22}{39}$$

by the Law of total probability.

Answer: $P(Y) = \frac{22}{39}$.