Answer on Question #62702 – Math – Statistics and Probability

Question

Suppose a box contains 4 red balls and 3 black balls. Compute the probability that the second ball drawn is red if the first ball drawn was black.

Solution

If the first ball drawn was black, there remain 6 balls, of which 4 are red. Let's count ordered pairs of drawn balls.

Thus, the conditional probability (the probability that the second ball drawn is red if the first ball drawn was black) will be

$$\mathbb{P}\left(2^{\text{nd}} \text{ is red} \mid 1^{\text{st}} \text{ is black}\right) = \frac{\mathbb{P}\left(2^{\text{nd}} \text{ is red} \cap 1^{\text{st}} \text{ is black}\right)}{\mathbb{P}(1^{\text{st}} \text{ is black})} = \frac{(3 \times 4)/(7 \times 6)}{(3 \times 6)/(7 \times 6)}$$

$$= \frac{12/42}{18/42} = \frac{12}{18} = \frac{2}{3}.$$

Answer: $\frac{2}{3}$.