

Answer on Question #74951-Math-Statistics and Probability

There are three urns, urn 1 having 5 white and 3 black balls, urn 2 with 4 white and 4 black balls and urn 3 with 3 white and 5 black balls. A fair die is tossed and

- i) urn 1 is chosen if dice shows up 1,2 or 3,
- ii) urn 2 is chosen if dice shows up 4 or 5,
- iii) urn 3 is chosen if dice shows up 6.

2 balls are drawn at random from the chosen urn. What is the probability that one of the balls drawn is white and the other black?

Solution

$$P(\text{urn 1}) = \frac{3}{6} = \frac{1}{2}, P(\text{urn 2}) = \frac{2}{6} = \frac{1}{3}, P(\text{urn 3}) = \frac{1}{6}$$

$$P(\text{White}) = \frac{1}{2} \binom{5}{8} + \frac{1}{3} \binom{4}{8} + \frac{1}{6} \binom{3}{8} = \frac{13}{24}$$

$$P(\text{Black}) = \frac{1}{2} \binom{3}{8} + \frac{1}{3} \binom{4}{8} + \frac{1}{6} \binom{5}{8} = \frac{11}{24}$$

The probability that one of the balls drawn is white and the other black is

$$P(WB) = \binom{13}{24} \binom{11}{24} = \frac{143}{576} \approx 0.2483$$

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