2.5.4 Let R_i, B_i, and W_i be the events that red, black, and white chips are drawn from urn i, $i = 1, 2$. Then $P(\text{both chips drawn are same color}) = P((R_1 \cap R_2) \cup (B_1 \cap B_2) \cup (W_1 \cap W_2)) = P(R_1) \cdot P(R_2) + P(B_1) \cdot P(B_2) + P(W_1) \cdot P(W_2)$ [because the intersections are mutually exclusive and the individual draws are independent]. But $P(R_1) \cdot P(R_2) + P(B_1) \cdot P(B_2) + P(W_1) \cdot P(W_2) =$

$$\left(\frac{3}{10}\right)\left(\frac{2}{9}\right)+\left(\frac{2}{10}\right)\left(\frac{4}{9}\right)+\left(\frac{5}{10}\right)\left(\frac{3}{9}\right) = 0.32.$$

2.5.14 $P(A) = \frac{3}{6}$, $P(B) = \frac{2}{6}$, $P(C) = \frac{6}{36}$, $P(A \cap B) = \frac{6}{36}$, $P(A \cap C) = \frac{3}{36}$, $P(B \cap C) = \frac{2}{36}$, and $P(A \cap B \cap C) = \frac{1}{36}$. It follows that A, B, and C are mutually independent because

$$P(A \cap B \cap C) = \frac{1}{36} = P(A) \cdot P(B) \cdot P(C) = \frac{3}{6} \cdot \frac{2}{6} \cdot \frac{6}{36}, \; P(A \cap B) = \frac{6}{36} = P(A) \cdot P(B) = \frac{3}{6} \cdot \frac{2}{6},$$

$$P(A \cap C) = \frac{3}{36} = P(A) \cdot P(C) = \frac{3}{6} \cdot \frac{6}{36}, \text{ and } P(B \cap C) = \frac{2}{36} = P(B) \cdot P(C) = \frac{2}{6} \cdot \frac{6}{36}.$$

2.5.20 Let A_H, A_T, B_H, B_T, C_H, and C_T denote the events that players A, B, and C throw heads and tails on individual tosses. Then $P(A \text{ throws first head}) = P(A_H \cup (A_T \cap B_T \cap C_T \cap A_H) \cup \cdots)$

$= \frac{1}{2} + \frac{1}{2}\left(\frac{1}{8}\right) + \frac{1}{2}\left(\frac{1}{8}\right)^2 + \cdots = \frac{1}{2}\left(\frac{1}{1 - 1/8}\right) = \frac{4}{7}$. Similarly, $P(B \text{ throws first head}) =$

$P((A_T \cap B_H) \cup (A_T \cap B_T \cap C_T \cap A_T \cap B_H) \cup \ldots) = \frac{1}{4} + \frac{1}{4}\left(\frac{1}{8}\right) + \frac{1}{4}\left(\frac{1}{8}\right)^2 + \ldots = \frac{1}{4}\left(\frac{1}{1 - 1/8}\right) = \frac{2}{7}$.

$P(C \text{ throws first head}) = 1 - \frac{4}{7} - \frac{2}{7} = \frac{1}{7}$.