Section 1.2

2. \( S = \{(x, y) : x = 1, 2, \ldots, 10, \ y = 1, 2, \ldots, 10, \ x \neq y\} \), where \( x \) is the first number drawn and \( y \) is the second. \( B = \{(1, 2), (2, 1)\} \).

4. Since 18 persons are to be selected, an experimental outcome is simply a listing of the 18 persons from the 45 to be selected.

6. \( S = \{1, 2, 3\} \).

8. Interchange \( '(A U B) \) and \( P(A \cap B) \) in the result of Theorem 1.4.

10. \( S = \{(x_1, x_2, x_3) : x = 1, 2, \ldots, 8, \ i=1, 2, 3, x_1 \neq x_2 \} \).

12. No.

14. \( P(A \cap B) = 1 - \frac{1}{2} = \frac{1}{2}; \ P(A) = \frac{3}{5} + \frac{2}{5} = \frac{5}{2} \).

16. \( P(S) = 1 = P(A_1) + 2P(A_1) + \cdots + 5P(A_1) = 15P(A_1) = \frac{15}{2} \).

Section 1.3

2. \( \begin{array}{c} \frac{3}{21}, \frac{2}{21}, \frac{3}{21}, \frac{2}{21}, \frac{3}{21}, \frac{2}{21} \end{array} \).

4. The probability either one wins is \( \frac{3}{36} \); the probability of no winner is \( \frac{33}{36} \).

6. The 13th falls on a Friday means the 6th, 20th, and 27th do as well. These four dates are the most likely for a Friday.

8. \( 28\) persons.

10. \( \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \frac{1}{3} \).

12. One such assignment is \( \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \frac{1}{3} \) with the 3-tuples listed in the order given in Example 1.18. The probabilities of winning the first games then are \( \frac{7}{12} \) for \( A \) and \( D \), \( \frac{5}{12} \) for \( B \) and \( C \).

14. No. Use instead \( S_1 = T \times T \times T \), where \( T = \{h, t\} \) (standing for heads, tails, respectively) leading to \( \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \frac{1}{3} \) as the single-element event probabilities for the \( S \) mentioned in the exercise.

16. The other four splits are \( [(1, 5, 9), (2, 6, 7), (3, 4, 8)], [(1, 6, 8), (2, 3, 9), (4, 5, 7)], [(1, 6, 8), (2, 4, 9), (3, 5, 7)], and \( [(1, 7, 8), (2, 4, 9), (3, 5, 6)] \).

Section 1.4

2. \( 4! / 6! = 1 / 30 \).

4. There are 30 2-tuples for the position numbers of these two individuals, of which 10 have them side by side; \( \frac{1}{3} \).

6. \( 2(4)(3)(4) = 96 \).

8. \( 9! = 362,880 \), \( 5P_5 = 60,480 \), \( 60,480 - 720 = 59,760 \), \( 720 / 60,480 = .0119 \).

10. \( a. \binom{13}{5} \binom{7}{5} \binom{2}{2} = 3744 \)

\( b. \binom{13}{5} \binom{7}{5} = 5148 \). (This number includes the 40 straight flushes.)

\( c. \binom{10}{5}^2 = 10,240 \). (This number includes the 40 straight flushes.)

\( d. \binom{13}{5} \binom{7}{5} \binom{2}{2} = 54,912 \)

\( e. \binom{13}{5} \binom{7}{5} \binom{2}{2} = 123,552 \)

\( f. \binom{13}{5} \binom{7}{5} \binom{2}{2} = 1,098,240 \)

12. \( a. \binom{10}{5} = 252 \)

\( b. \binom{10}{5} / 210 = .1196 \)

\( c. \binom{10}{5} / 210 = .053 \)

14. \( a. \binom{10}{5} / 210 = .040 \)

\( b. \binom{10}{5} / 210 = .0055 \)

16. \( 4 + 14 = 18 + 180 + 180 = 522 \)

32. \( a. \binom{10}{5} = 252 \)

\( b. \binom{10}{5} / 210 = .1196 \)

\( c. \binom{10}{5} / 210 = .053 \)

Section 1.5

2. \( \frac{1}{1} \)

4. \( \frac{1}{2} \)

6. \( A \cup B = A \cup (B \cap A) \)

8. \( a. \binom{3}{2} / \binom{10}{2} \)

\( b. \frac{2}{100} \)

12. \( a. \frac{1}{2} \)

\( b. \) No.

14. \( a. (9)(8)(7)(6) = 3024 \)

\( b. .1, .18 \)

\( c. \) No.

16. \( \frac{5}{13} \binom{12}{5} + \frac{11}{13} \binom{12}{4} = .46 \)

\( 20. \binom{99}{95} / \binom{99}{95} = .9995 \)

\( 22. \binom{99}{95} / \binom{99}{95} = .581 \)

\( b. \frac{71}{144}, \frac{80}{116} \)

\( c. \) No.

Section 1.6

4. \( a. 1 - (1)(2)(3) = .994 \)

\( b. (1)(2)(7) = .014 \)

\( c. (9)(2)(3) / .994 = .0543 \)