7.34  
\(a. \ \frac{1}{2}\).  
\(b. \ \frac{1}{2}\).  
\(c. \ \frac{3}{4} \cdot \frac{1}{2} = \frac{3}{8}\).  
\(d. \ \frac{1}{2} + \frac{1}{2} - \frac{3}{8} = \frac{5}{8}\).  

7.35  
\(a. \) No, they are not independent.  \(P(A \text{ in both classes}) \neq P(A \text{ in English}) \cdot P(A \text{ in history})\), as it would for independent events.  
\(b. \)  
\[P(A \text{ in either English or history}) = P(A \text{ in English}) + P(A \text{ in history}) - P(A \text{ in both classes}) = .70 + .60 - .50 = .80.\]  
\(c. \)  
\[P(A^c \text{ and B}) = P(A^c) \cdot P(B|A^c) = (.55)(.80) = .44. \text{ This is the probability of being a Republican and voting for Candidate X.}\]  
\(d. \)  
\[P(B) = P(A \text{ and B}) + P(A^c \text{ and B}) = .485. \]  
\(e. \) Candidate X received 48.5% of the votes.  

7.36  
\(a. \)  
\[P(A) = .55; P(A^c) = .45; P(B|A) = .80; P(B|A^c) = .10.\]  
\(b. \)  
\[P(A \text{ and B}) = P(A)P(B|A) = (.55)(.80) = .44. \text{ This is the probability of being a Republican and voting for Candidate X.}\]  
\(c. \)  
\[P(A^c \text{ and B}) = P(A^c)P(B|A^c) = (.45)(.10) = .045. \text{ This is the probability of being a non-Republican and voting for Candidate X.}\]  
\(d. \)  
\[P(B) = P(A \text{ and B}) + P(A^c \text{ and B}) = .485. \]  
\(e. \) Candidate X received 48.5% of the votes.  

7.38  
\(a. \) Probability = \(11/12\) that the first stranger does not share your birth month.  
\(b. \) Probability = \(11/12\) that the second stranger does not share your birth month.  
\(c. \) Probability = \((11/12)(11/12) = 121/144 = .84\) that neither shares your birth month. Use the multiplication rule for two independent events (Rule 3b).  
\(d. \)  
\[P(\text{at least one}) = 1 - P(\text{neither}) = 1 - .84 = .16, \text{ or 23/144.}\]  
The event that at least one of the two shares your birth month is the complement of the event that neither does.  

7.39  
\(a. \)  
\[P(\text{first stranger shares your birth month}) = 1/12.\]  
\(b. \)  
\[P(\text{second stranger shares your birth month}) = 1/12\]  
\(c. \)  
\[P(\text{both share your birth month}) = (1/12)(1/12) = 1/144\]  
Use the multiplication rule for two independent events (Rule 3b).  
\(d. \)  
\[A = \text{first stranger shares your birth month}; B = \text{second stranger shares your birth month}\]  
\[P(\text{either A or B}) = P(A) + P(B) - P(A \text{ and B})\]  
\[P(\text{either A or B}) = (1/12) + (1/12) - (1/144) = 23/144 = .16.\]  

7.44  
\(a. \)  
<table>
<thead>
<tr>
<th>Magazine Type</th>
<th>International</th>
<th>National</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>News</td>
<td>20</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Sports</td>
<td>5</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>25</td>
<td>50</td>
</tr>
</tbody>
</table>

\(b. \)  
P\((\text{includes international news | news magazine}) = 20/30 = .67.\)  
\(c. \)  
\[25/50 = .50. \text{ There are 50 magazines, 20 include international news and 5 include international sports.}\]  

7.48  
\(a. \)  
\[P(A) = .80; P(A \text{ and B}) = .25.\]  
\(b. \)  
\[P(B|A) = P(A \text{ and B})/P(A) = .25/.80 = .3125.\]  
\(c. \)  
\[P(B^c|A) = 1 - P(B|A) = 1 - .3125 = .6875.\]
8.1  a. Continuous  
b. Discrete  
c. Continuous  
d. Discrete  
e. Discrete
8.2  a. Discrete  
b. Continuous  
c. Discrete  
d. Discrete
8.3  a. Discrete  
b. Continuous  
c. Continuous  
d. Discrete
8.7  $1 - (0.05 + 0.20 + 0.50 + 0.15) = 0.10$. (The sum of all probabilities must equal 1.)
8.8  a. **Condition 1:** Sum = $0.1 + 0.1 + 0.3 + 0.5 = 1$.
   **Condition 2:** Each of the four probabilities is between 0 and 1.
   b.
   
   ![Figure for Exercise 8.8c]
   
   c.
   
<table>
<thead>
<tr>
<th>$k$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(X \leq k)$</td>
<td>.1</td>
<td>.2</td>
<td>.5</td>
<td>1</td>
</tr>
</tbody>
</table>

   As an example, $P(X \leq 1) = P(X=0) + P(X=1) = .1 + .2 = .3$.
8.10  a. .80. Find this by adding the probabilities for $X = 0$, 1, and 2.
   $P(X \leq 2) = P(X=0) + P(X=1) + P(X=2) = .14 + .27 + .39 = .80$.
   b. $P(X = 1 \text{ or } X = 2) = .37 + .29 = .66$.
   c. $P(X > 0) = 1 - P(X = 0) = 1 - .14 = .86$. This can also be found by adding probabilities for $X = 1$, 2, and 3.
   d.
   
<table>
<thead>
<tr>
<th>$k$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(X \leq k)$</td>
<td>.14</td>
<td>.51</td>
<td>.80</td>
<td>.95</td>
<td>1</td>
</tr>
</tbody>
</table>
8.12 The answer is $18/36 = 1/2$. Add probabilities given in Example 8.10 for $X = 2, 4, 6, 8, 10,$ and 12.

8.17

a. 0.06 + 0.13 = 0.19
b. $P(X > 0) = 1 - P(X = 0) = 1 - 0.73 = 0.27$.
   Another method is to add the probabilities for $X = 1, 2, 3, 4$.

c. 

<table>
<thead>
<tr>
<th>$k$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(X \leq k)$</td>
<td>0.73</td>
<td>0.89</td>
<td>0.95</td>
<td>0.98</td>
<td>1</td>
</tr>
</tbody>
</table>

8.18

a. $30$, the cost of the insurance.
b. $X = 0$ with probability 0.90 (the probability he doesn’t need to be towed during a year), and $X = 100$ with probability 0.10 (the probability he needs to be towed during a year).
c. If he buys insurance, $E(X) = 30$.
   If he does not buy insurance, $E(X) = 0 \times 0.90 + 100 \times 0.10 = 10$.
   In the long run, he’s better off to not buy the insurance. The average cost per year, without insurance will be $10, which is less than the $30 per year cost of the insurance.

8.19

a. $E(X) = (0 \times 0.05) + (1 \times 0.60) + (2 \times 0.30) + (3 \times 0.05) = 1.35$.
b. The average number of children per family over many families similar to the Braam family.
c. No. The expected value of 1.35 is an impossible number of children for one family.

8.33

a. Yes. $n = 10$ and $p = 0.5$.
b. No. $p$ is not the same from trial to trial.
c. No. The “trials” (cities) are not independent of each other as they will tend to have the same weather.
d. No. The “trials” (children) are not independent of each other because they are in the same class and flu is contagious.

8.34

a. $n = 30$ and $p = 0.16$.
b. $n = 10$ and $p = 0.10$.
c. $n = 20$ and $p = 0.30$.

8.35

a. $\mu = E(X) = np = (30)(0.16) = 5$.
b. $\mu = E(X) = np = (10)(0.10) = 0.10$.
c. $\mu = E(X) = np = (20)(0.30) = 6$. 
8.38  
a. The probability of success does not remain the same from one trial (game) to the next. The probability of
winning a game against a good team is not the same as the probability of winning a game against a poor
team.
b. The number of trials is not specified in advance.
c. The probability of success does not remain the same from one trial to the next because whether or not the
first card is an ace affects the probability that the next card is an ace, and so on. This also means that trials
are not independent.

8.41  
The answers for this exercise can be found using any of the methods discussed in Section 8.4, including the
use of Minitab or Excel.
a. \( P(X = 4) = .2051 \)
b. \( P(X \geq 4) = 1 - P(X \leq 3) = 1 - .6496 = .3504 \)
c. \( P(X \leq 3) = .6496 \)
d. \( P(X = 0) = .5905 \)
e. \( P(X \geq 1) = 1 - P(X = 0) = 1 - .5905 = .4095 \)

8.42  
a. Note that 1/4 of 1,000 is 250 so the desired probability is \( P(X \geq 250) \). \( n = 1000 \) and \( p = \) the proportion of
adults in the United States living with a partner, but not married at the time of the sampling. The value of \( p \)
is not known.
b. The desired probability is \( P(X \geq 110) \), \( n = 500 \), and \( p = .20 \).
c. Note that 70% of 20 is 14 so the desired probability is \( P(X \geq 14) \). \( n = 20 \), and \( p = .50 \).

8.43  
The formulas are \( \mu = np \) and \( \sigma = \sqrt{np(1-p)} \)
a. \( \mu = 10(1/2) = 5 \) and \( \sigma = \sqrt{10(.5)(1-.5)} = 1.5811 \)
b. \( \mu = 100(1/4) = 25 \) and \( \sigma = \sqrt{100(.25)(1-.25)} = 4.33 \)
c. \( \mu = 2500(1/5) = 500 \) and \( \sigma = \sqrt{2500(.2)(1-.2)} = 20 \)
d. \( \mu = 1(1/10) = .1 \) and \( \sigma = \sqrt{1(.1)(1-.1)} = .3 \)
e. \( \mu = 30(.4) = 12 \) and \( \sigma = \sqrt{30(.4)(1-.4)} = 2.683 \)