1. Express the indicated degree of likelihood as a probability value between 0 and 1.

   a. While this exercise was being created, Weather.com indicated that there is a 20% chance of rain for the author’s home region.

   b. When guessing the answer to a multiple-choice question on an SAT test, the chance of guessing incorrectly is 4 in 5.

2. A roulette wheel has 38 slots. One slot is 0, another is 00, and the others are numbered 1-36, respectively. You place a bet that the outcome is an odd number.

   a. What is the probability of winning?

   b. What are the actual odds against winning?

   c. When you bet that the outcome is an odd number, the payoff are 1:1. How much profit do you make if you bet $18 and win?

3. Two thousand randomly selected adults were asked if they are in favor of or against cloning. The following table gives the responses:

<table>
<thead>
<tr>
<th></th>
<th>In Favor</th>
<th>Against</th>
<th>No Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>395</td>
<td>405</td>
<td>100</td>
</tr>
<tr>
<td>Female</td>
<td>300</td>
<td>680</td>
<td>120</td>
</tr>
</tbody>
</table>

Suppose one person is randomly selected from the 2000 adults.

   a. Find the probability that this person is against of cloning.

   b. Are the events “In Favor” and “No Opinion” mutually exclusive? Why or why not?

   c. $P(\text{Female or Male})$

   d. $P(\text{No Opinion / Female})$
4. The following table gives the probability distribution of the number of breakdowns per week for a machine based on past data.

<table>
<thead>
<tr>
<th>Breakdowns per week</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
<td>.15</td>
<td>.20</td>
<td>.35</td>
<td>.30</td>
</tr>
</tbody>
</table>

a. Present this probability graphically.

b. $P(x = 1)$

c. $P(x \leq 1)$

d. Probability that $x$ assumes a value greater than 3.

5. Refer to Problem 4. Calculate the mean and standard deviation of $x$ for that probability distribution.
6. Let x be a discrete random variable that possesses a binomial distribution. [12pts]

a. Write the probability distribution of x for n = 5 and p = .80

b. Find P(x=0) using the Binomial Formula.

c. What are the mean and standard deviation of the probability distribution developed in part a?

7. For the standard normal distribution, find the area within 1.5 standard deviations of the mean—that is, the area between \( \mu - 1.5\sigma \) and \( \mu + 1.5\sigma \). [8pts]

8. Let x be a continuous random variable that has a normal distribution with a mean of 50 and a standard deviation of 10. Convert the following x values to z values and find the probability to the left of these points.

(a) \( x = 50 \)

(b) \( x = 35 \)
9. Let \( x \) be a continuous random variable that is normally distributed with a mean of 65 and a standard deviation of 15. Find the probability that \( x \) assumes a value greater than 79.

10. According to the records of an electric company serving the Boston area, the mean electricity consumption for all households during winter is 1650 kilowatt-hours per month. Assume that the monthly electricity consumptions during winter by all household in this area have a normal distribution with a mean of 1650 kilowatt-hours and a standard deviation of 320 kilowatt-hours. What percentage of the households in this area have a monthly electricity consumption of 900 to 1300 kilowatt-hours? (Graph the area under the normal curve)

11. The amount of electricity bills for a household in a city have a skewed probability distribution with mean of $140 and standard deviation of $30. Find the probability that the mean amount of electrical bills for a random sample of 75 household selected from this city will be between $130 and $136.