**Exercise 1**

List the elements of each of the following sample spaces:

(a) the set of integers between 1 and 50 divisible by 8;
(b) the set \( S = \{ x | x^2 + 4x - 5 = 0 \} \);
(c) the set of outcomes when a coin is tossed until a tail or three heads appear;
(d) the set \( S = \{ x | x \text{ is a continent} \} \);
(e) the set \( \{ x | 2x - 4 \geq 0 \text{ and } x < 1 \} \).

**Exercise 2**

Which of the following events are equal?

(a) \( A = \{ 1, 3 \} \);
(b) \( B = \{ x | x \text{ is a number on a die} \} \);
(c) \( C = \{ x | x^2 - 4x + 3 = 0 \} \);
(d) \( D = \{ x | x \text{ is the number of heads when six coins are tossed} \} \).

**Exercise 3**

Registrants at a large convention are offered 6 sightseeing tours on each of 3 days. In how many ways can a person arrange to go on a sightseeing tour planned by the convention?

**Exercise 4**

Find the errors in each of the following statements:

(a) The probabilities that an automobile salesperson will sell 0, 1, 2, or 3 cars on any given day in February are, 0.19, 0.38, 0.29, and 0.15.
(b) The probability that it will rain tomorrow is 0.40 and the probability that it will not rain tomorrow is 0.52.
(c) The probabilities that a printer will make 0, 1, 2, 3, or 4 or more mistakes in setting a document are, respectively, 0.19, 0.34, -0.25, 0.43, and 0.29.
(d) On a single draw from a deck of playing cards the probability of selecting a heart is \( \frac{1}{4} \), the probability of selecting a black card is \( \frac{1}{2} \), and the probability of selecting both a heart and a black card is \( \frac{1}{8} \).

**Exercise 5**

In *USA Today* (Sept. 5, 1996) the results of a survey involving the use of sleepwear while traveling were listed as follows:

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underwear</td>
<td>0.220</td>
<td>0.024</td>
</tr>
<tr>
<td>Nightgown</td>
<td>0.002</td>
<td>0.180</td>
</tr>
<tr>
<td>Nothing</td>
<td>0.160</td>
<td>0.018</td>
</tr>
<tr>
<td>Pajamas</td>
<td>0.102</td>
<td>0.073</td>
</tr>
<tr>
<td>T-shirt</td>
<td>0.046</td>
<td>0.088</td>
</tr>
<tr>
<td>Other</td>
<td>0.084</td>
<td>0.003</td>
</tr>
</tbody>
</table>

(a) What is the probability that a traveler is a female who sleeps in the nude?
(b) What is the probability that a traveler is male?
(c) Assuming the traveler is male, what is the probability that he sleeps in pajamas?
(d) What is the probability that a traveler is male if he sleeps in pajamas or a T-shirt?

**Exercise 6**

A town has 2 fire engines operating independently. The probability that a specific engine is available when needed is 0.96.

(a) What is the probability that neither is available when needed?
(b) What is the probability that a fire engine is available when needed?

**Exercise 7**

One overnight case contains 2 bottles of aspirin and 3 bottles of thyroid tablets. A second tote bag contains 3 bottles of aspirin, 2 bottles of thyroid tablets, and 1 bottle of laxative tablets. If 1 bottle of tablets is taken at random from each piece of luggage, find the probability that

(a) both bottles contain thyroid tablets;
(b) neither bottle contains thyroid tablets;
(c) the 2 bottles contain different tablets.
EXERCISE 8

Pollution of the rivers in the United States has been a problem for many years. Consider the following events:

\[ A = \{ \text{The river is polluted.} \} \]
\[ B = \{ \text{A sample of water tested detects pollution.} \} \]
\[ C = \{ \text{Fishing is permitted.} \} \]

Assume:

\[
\begin{align*}
P(A) &= 0.3 \\
P(B | A) &= 0.75 \\
P(B | A') &= 0.20 \\
P(C | A \cap B) &= 0.20 \\
P(C | A' \cap B) &= 0.15 \\
P(C | A \cap B') &= 0.80 \\
P(C | A' \cap B') &= 0.90
\end{align*}
\]

(a) Find \( P(A \cap B \cap C) \).

(b) Find \( P(B' \cap C) \).

(c) Find \( P(C) \).

(d) Find the probability that the river is polluted, given that fishing is permitted and the sample tested did not detect pollution.