1. For each of the following sets, determine whether 2 is an element of the set.
   (a) \( \{ x \in \mathbb{R} \mid x \text{ is an integer greater than 1} \} \)
   (b) \( \{ x \in \mathbb{R} \mid x \text{ is the square of an integer} \} \)
   (c) \( \{2, \{2\}\} \)
   (d) \( \{\{2\}, \{\{2\}\}\} \)
   (e) \( \{\{2\}, \{2, \{2\}\}\} \)
   (f) \( \{\{\{2\}\}\} \)

2. Determine whether each of these statements is true or false.
   a) \( 0 \in \emptyset \)
   b) \( \emptyset \in \{0\} \)
   c) \( \{0\} \subset \emptyset \)
   d) \( \emptyset \subset \{0\} \)
   e) \( \{0\} \in \{0\} \)
   f) \( \{0\} \in \{0\} \)
   g) \( \emptyset \subseteq \{\emptyset\} \)

3. Let \( A = \{a, b, c\} \), \( B = \{x, y\} \) and \( C = \{0, 1\} \). Find
   a) \( A \times B \times C \)
   b) \( C \times B \times A \)
   c) \( C \times A \times B \)
   d) \( B \times B \times B \)

4. How many different elements does \( A \times B \) have if \( A \) has \( m \) elements and \( B \) has \( n \) elements?

5. What is the cardinality of each of these sets?
   a) \( \{a\} \)
   b) \( \{\{a\}\} \)
   c) \( \{a, \{a\}\} \)
   d) \( \{a, \{a\}, \{a, \{a\}\}\} \)

6. Let \( A = \{0, 2, 4, 6, 8, 10\} \), \( B = \{0, 1, 2, 3, 4, 5, 6\} \), and \( C = \{4, 5, 6, 7, 8, 9, 10\} \). Find
   a) \( A \cap B \cap C \)
   b) \( A \cup B \cup C \)
   c) \( (A \cup B) \cap C \)
   d) \( (A \cap B) \cup C \)
7. How many license plates can be made using either three letters followed by three digits or four letters followed by two digits?

8. How many different functions are there from a set with 8 elements to a set with 3 elements?

9. How many bit strings of length seven either begin with two 0’s or end with three 1’s?

10. How many subsets with more than two elements does a set with 100 elements have?