1. Use i) the roster method and ii) set-builder notation to write each set.
   a. The set of whole numbers less than 8
   b. The set of counting numbers larger than -3 and less than or equal to 6.

2. True or false
   a. \{3\} \in \{1, 2, 3, 4\}
   b. -11 \in I
   c. The set of small numbers is a well-defined set

3. Let \(U = \{2, 6, 8, 10, 12, 14, 16, 18\}\), \(A = \{2, 6, 10\}\), \(B = \{6, 10, 16, 18\}\), and \(C = \{14, 16\}\). Find each of the following.
   a. \(A \cap B\)
   b. \(A' \cap B\)
   c. \(A \cup (B \cap C)\)
   d. \((A \cap B')'\)

4. Determine if the first set is a proper subset of the second set.
   a. The set of natural numbers; the set of whole numbers
   b. The set of counting numbers; the set of natural numbers

5. List all the subsets of the given set.
   a. \{I, II\}
   b. \{s, u, n\}

6. Find the number of subsets of the given set.
   a. The set of the four musketeers.
   b. The set of the letters of “uncopyrightable”, which is the longest English word with not repeated letters.

7. Draw a Venn diagram to represent the given set
   a. \(A \cap B'\)
   b. \((A \cup B) \cup C'\)

8. Draw Venn diagram to determine whether the expressions are equal for all sets A, B, and C.
   a. \(A' \cup (B \cup C); (A' \cup B) \cup (A' \cup C)\)
   b. \(A \cap (B' \cap C); (A \cup B') \cap (A \cup C)\)

9. Use set notation to describe the shaded region

10. Draw a Venn diagram with each of the given elements placed in the correct region.
    a. \(U = \{e, h, r, d, w, s, t\}\)
        \(A = \{t, r, e\}\)
        \(B = \{w, s, r, e\}\)
        \(C' = \{s, r, d, h\}\)
11. In a survey at a health club, 208 members indicated that they enjoy aerobic exercises, 145 indicated that they enjoy weight training, 97 indicated that they enjoy both aerobics and weight training, and 135 indicated that they do not enjoy either of these types of exercise. How many members were surveyed?

12. A gourmet coffee bar conducted a survey to determine the preference of its customers. Of the customers surveyed,
   - 221 like espresso
   - 127 like cappuccino and chocolate-flavored coffee
   - 182 like cappuccino
   - 136 like espresso and chocolate-flavored coffee
   - 209 like chocolate-flavored coffee
   - 96 like all three types of coffee
   - 116 like espresso and cappuccino
   - 82 like none of these types of coffee.

   How many of the customers in the survey:
   a. Like only chocolate-flavored coffee?
   b. Like cappuccino and chocolate-flavored coffee but not espresso?
   c. Like espresso and cappuccino but not chocolate-flavored coffee?
   d. Like exactly one of the three types of coffee?

13. Establish a one-tone correspondence between the sets.
   a. \( \{x | x > 10 \text{ and } x \in \mathbb{N}\}; \{2, 4, 6, 8 \ldots 2n, \ldots \} \)

14. Show that the given set is an infinite set.
   a. \( A = \{6, 10, 14, 18, \ldots 4n + 2, \ldots \} \)

15. State the cardinality of each set.
   a. \( \{5, 6, 7, 8, 6\} \)
   b. \( \{0, \emptyset\} \)
   c. The set of integers less than 1,000,000.
   d. The set of irrational numbers between 0 and 1

16. Find each of the following, where \( \aleph_0 \) and \( c \) are transfinite cardinal numbers.
   a. \( \aleph_0 - 700 \)
   b. \( \aleph_0 + (\aleph_0 + \aleph_0) \)
   c. \( 5\aleph_0 \)