1. Given the sets \( A = \{x | x \text{ is a digit of the number } 226,408\} \), \( B = \{x | x - 3 = -1\} \), \( C = \{x | \frac{x}{2} = 0\} \), \( D = \{x | x > 0 \text{ and } x^2 = 4\} \), \( E = \{x | \frac{x}{2} = x - 3\} \), \( F = \{x | \frac{x}{4} = 2\} \), and \( G = \emptyset \), express \( A \) in terms of \( B, C, D, E, F, \) and \( G \).

2. Given the sets \( R = \{x | x \text{ is a letter of the word } \text{"care"}\} \), 
\( S = \{x | x \text{ is a letter of the word } \text{"acre"}\} \), \( T = \{x | x \text{ is a letter of the word } \text{"car"}\} \), \( V = \{x | x \text{ is a letter of the word } \text{"are"}\} \), \( W = \{x | x \text{ is a letter of the word } \text{"book"}\} \), fill in the blanks below:

\[
\begin{align*}
S & \underline{} \quad R \\
S & \underline{} \quad T \\
R & \underline{} \quad V \\
T & \underline{} \quad V \\
S \cap W & = \underline{} \\
T \cup V & = \underline{} \\
\end{align*}
\]

\[
\begin{align*}
a & \underline{} \quad T \\
u & \underline{} \quad T \\
\underline{} & \in \emptyset \\
\end{align*}
\]

\[
\begin{align*}
\{b\} & \underline{} \quad T \\
S \cup T & = \underline{} \\
S \cap T & = \underline{} \\
\end{align*}
\]
3. In the Venn diagrams below, shade the following sets: $A \cap B^c$, $(A \cap B)^c$, $A^c \cap B^c$, $A \cup B^c$. 
4. In the Venn diagrams below, shade the following sets: \( A \cap B^c \cap C \), \( (A \cap B)^c \cup C \), \( A^c \cap B^c \cap C^c \), \( A \cap B^c \).

5. Simplify the following:

\[ (A^c \cup B)^c = \quad \quad \quad \quad (A \cap B^c)^c = \] 

\[ (A \cap B \cap C)^c = \quad \quad \quad \quad (A \cup B \cup C)^c = \]
6. The customers of a coffee shop are surveyed. Let $U$ denote the set of all the customers surveyed, and let $A = \{x \in U | x \text{ is female}\}$, $B = \{x \in U | x \text{ is male}\}$, $C = \{x \in U | x \text{ has a cookie with their coffee}\}$, $D = \{x \in U | x \text{ drinks water before coffee}\}$.
Write the set that represents each statement.
   a. The coffee shop customers who are men and don’t have a cookie with their coffee.
   b. The coffee shop customers who are women and drink water before their coffee but don’t have a cookie with their coffee.

7. In the town of Springfield, 3090 people are surveyed, and it is found that 1030 jog but don’t go to a gym, 1110 go to the gym but don’t jog, and 260 neither jog nor go to the gym.
   a. How many both jog and go to the gym?
   b. How many jog?
8. Let \( n(U) = 102 \), \( n(A) = 18 \), \( n(B) = 38 \), and \( n(A \cap B) = 14 \). Compute:
   a. \( n(A^c \cap B) = \) ________
   b. \( n(B^c) = \) ________
   c. \( n(A^c \cap B^c) = \) ________
   d. \( n(A^c \cap A) = \) ________
   e. How many subsets does \( A \) have?
   f. How many proper subsets does \( A \) have?

9. Let \( A, B, \) and \( C \) be sets in a universal set \( U \). We are given that \( n(U) = 150 \), \( n(A) = 60 \), \( n(B) = 63 \), \( n(C) = 93 \), \( n(A \cap B) = 33 \), \( n(A \cap C) = 42 \), \( n(B \cap C) = 36 \), \( n(A \cap B \cap C^c) = 6 \). What is \( n((A \cup B \cup C)^c) \)? What is \( n(A^c \cap B^c \cap C) \)?
10. An ice cream shop offers four different size cups, seven different colors for napkins, and four different colors for spoons. How many possible looks are there considering cups, napkins and spoons?

11. An ordered sequence must be formed by three letters followed by five digits.
   a. How many such sequences are there?
   b. How many if no repetitions of the letters are allowed?
   c. How many if no repetitions are allowed, for letters or digits?
   d. How many have no repetitions of letters or digits, and end with a 5?

12. Ten men and four women are lining up for a picture which has the four women in the middle and five men on each side. In how many ways can this be done?