1. If \( A = \{m, a, t, h, e, t_2, i, c, s\} \), how many subsets does set \( A \) have?

2. Given the Venn diagram:

   ![Venn Diagram](image)

   a. Shade \( N \cup (M \cap L^c) \).
   
   b. \( \{b, f\} = \)
   
   c. \( (N \cup L^c)^c = \)
   
   d. \( M^c \cup (L \cap M) = \)
   
   e. \( \{a, e, h\} = \)
   
   f. Give two examples of proper subsets as illustrated in the Venn diagram.

3. The providence of Maroon Isle has license plates that consist of 2 different letters, followed by 3 digits. If the letters are case-sensitive, how many different license plates are possible?
4. Sherry and Richard and 7 of their friends go to a dance performance. They all sit next to each other in the same row. How many ways can this be done if

a. Richard and Sherry must sit next to each other so they can hold hands?

b. Sherry, Richard, or William sits in the middle seat?

c. Richard and Sherry do not sit next to each other?

d. Sherry, Richard and William sit in the middle seats?

5. Of 100 cell phone owners, 60 own an iPod (I), 48 own an ear bud (E), and 19 own neither an iPod nor an ear bud. Of these cell phone owners, how many own both an ear bud and an iPod?
6. In how many ways can 6 graduate students and 4 undergraduate students be seated in a row if
   a. There are no restrictions?
   b. Graduates sit on one side and undergraduates sit on the other side?
   c. Graduate and undergraduate are seated alternately?
   d. One of the undergraduates, Kelby, must sit on one end?
   e. A graduate must sit on both ends?

7. How many five-digit numbers can be formed if one cannot be the first digit, no digit can be repeated, and each number formed must be odd?

8. In how many ways can a 15-question multiple-choice exam be answered if a student can choose only one of the five choices on each question?
9. Let set $A = \{n, r, q\}, B = \{t, n, v, d\}$ and $C = \{r, v, f\}$, such that $U = A \cup B \cup C$. Find the following.

a. \(A \cup B =\)

b. \(n(A) =\)

c. \(n(A^c \cap C) =\)

\[\left(B \cup C^c\right)^c =\]

d. \(\left(B \cup C^c\right)^c =\)

e. List an element of set $C$.

f. List a subset of set $A$ that is not proper.

g. How many proper subsets does set $B$ have?

h. \(A \cap \left(B^c\right)^c \cap C =\)

i. \(U^c =\)
10. Given the following sets, answer the questions.

\[ Q = \{ q, u, i, c, k, s, t, e, p \} \]
\[ R = \{ r, u, m, b, a \} \]
\[ T = \{ t, a, n, g, o \} \]
\[ U = Q \cup R \cup T \]

a. \( \{ a \} \in (R \cap T) \) True or False
b. \( n(R \cap Q) = \)
c. \( \{ a, t \} \subset T \) True or False
d. \( b \notin R^c \) True or False
e. \( \{ a, g, n, o, t \} = T \) True or False
f. \( Q \subseteq Q \) True or False
g. \( n(\{ \} ) = \)
h. \( g \subset T \) True or False
i. \( Q \cap (R \cup T^c) = \)
j. \( \{ r, u, m \} \subseteq R \) True or False
k. List all the subsets of \( Q \cap T \).
l. \( q \subset Q \) True or False
m. How many proper nonempty subsets does set \( T \) have?

n. \( n(\{R, Q\}) = \)
11. A survey of 300 students was conducted regarding whether or not each likes Facebook, Twitter, or MySpace. The results below were obtained.

- 150 liked Twitter
- 98 like MySpace
- 74 like Twitter and Facebook, but not MySpace
- 65 like only Facebook
- 24 like MySpace and Facebook
- 66 like Twitter and MySpace
- 88 like Twitter and Facebook

Fill in an appropriate Venn diagram illustrating the information.

a. How many liked at least two of these social media?

b. How many liked exactly one of these?

c. How many did not like any of these three social media?

d. Use set notation to describe the set of students who liked Facebook and MySpace but not Twitter.

e. Use set notation to describe the set of students who liked just Facebook.

f. Use set notation to describe the set of students who did not like any of these three social media.

g. Shade the set corresponding to \((T^c \cap M)^c \cap F\).