1. Place the elements of the sets in the proper locations on the Venn Diagram.

A. \( U = \{1,2,3,4,5,6,7,8,9\} \), \( A = \{1,2,7,8,9\} \), \( B = \{2,5,6,7,8,9\} \), \( C = \{2,4,6,9\} \)

B. \( U = \{a,b,c,d,e,f,g,h,i,j,k\} \), \( A = \{a,d,f,g,k\} \), \( B = \{a,b,d,i,j\} \), \( C = \{d,f,h,i,j,k\} \)

A. ![Venn Diagram A]

B. ![Venn Diagram B]

2. Use a Venn Diagram to shade each of the following sets:

a) \( A \cup B \cup C \)

b) \( (B \cup C)^c \cap A \)

c) \( (A \cap B) \cup (A \cap C) \)

d) \( (A \cap B) \cup (A \cap C)^c \)

e) \( \emptyset \)

f) \( A \cap B \cap C \)

g) \( (A \cap B \cap C)^c \)

h) \( A \cup (B \cap C) \)

i) \( A \cup (B \cap C)^c \)

j) \( [A \cap (B \cup C)]^c \)
3. Use Venn diagrams to verify DeMorgan’s Law \((A \cup B)' = A' \cap B'\) and \((A \cap B)' = A' \cup B'\).

4. Using the Venn Diagram below find the value of the indicated expressions:

\[ \begin{align*}
A & \quad B \\
27 & \quad 36 & \quad 41 \\
36 & \quad 22 & \quad 17 \\
39 & \quad & \\
53 & \quad & \\
& \quad & \\
C & \quad & \text{U}
\end{align*} \]

a) \(n(A \cup B \cup C)\)
b) \(n(A \cap B \cap C)\)
c) \(n(B')\)
d) \(n[(A \cap B)']\)
e) \(n[(A \cup B') \cap C']\)
f) \(n[(A \cap B') \cup C']\)
g) \(n[(A \cap B') \cap C']\)
h) \(n(\varnothing')\)
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i) \( n\left[^\left( A \cap B \cap C \right)^c \right] \)

Venn Diagrams Review Problems

5. Find the number of people in each of the following categories:

- a) Dancer, not a singer, but comedian
- b) Dancer, singer but not a comedian
- c) Not a dancer but singer and comedian
- d) Not a dancer not a singer nor a comedian
- e) Only a comedian
- f) Dancer, singer and comedian
- g) Dancer but not a singer or comedian
Answers:

1. A

2. a) 
   - [Diagram with shaded areas]

   b) 
   - [Diagram with no shading]

   c) 
   - [Diagram with shaded areas]

   d) 
   - [Diagram with shaded areas]
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e) [Diagram]
f) [Diagram]

g) [Diagram]
h) [Diagram]

i) [Diagram]
j) [Diagram]
3. 

\[(A \cup B)' \quad = \quad A' \cap B'
\]

\[(A \cap B)' \quad = \quad A' \cup B'
\]

4. 

\[a)235, \quad b)22, \quad c)119, \quad d)177, \quad e)27, \quad f)157
\]

\[g)27, \quad h)235, \quad i)213
\]

5. 

\[a)39, \quad b)275, \quad c)28, \quad d)58, \quad e)61, \quad f)2
\]

\[g)87\]