MGF 1106 – Section 2.3

Definitions: Given \( U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\} \)

\( A = \{2, 3\} \quad B = \{5, 9, 10\} \quad C = \{1, 2, 3, 4\} \quad D = \{2, 4, 5, 7, 9\} \)

<table>
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<th>Symbol</th>
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<td>( \cap )</td>
<td>Disjoint</td>
<td>( \quad )</td>
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<tr>
<td>( \cup )</td>
<td>Overlapping</td>
<td>( \quad )</td>
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Given \( U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\} \)

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

**Identify:**

1. \( D' \)
2. \( C' \)
3. \( A \cap B \)
4. \( A \cup B \)
5. \( A \cap C \)
6. \( A \cup C \)
7. \( C' \cup B \)
8. \( C \cap D' \)
9. \( C \cap \emptyset \)
10. \( C \cup \emptyset \)
11. \( (A \cap B)' \)
12. \( (B \cup C)' \)

**True or False:**

13. \( A \cap D = \emptyset \)
14. \( A \cup D = U \)
15. \( A \cap C = C \)
16. \( A \cup C = C \)
A Venn Diagram uses a rectangle to represent the universe, and circles to represent individual sets. The relationships between the sets are represented by overlapping or disjoint circles.

A Sample Venn Diagram is given below:

Use this diagram to answer the following questions:

1. What are all the elements of the universal set?
   \[ U = \{ \ldots \} \]

2. What are the elements of set A?
   \[ A = \{ \ldots \} \]

3. What are the elements of set B?
   \[ B = \{ \ldots \} \]

4. Which elements are in A and B?
   \[ A \cap B = \{ \ldots \} \]

5. Which elements are in A or B?
   \[ A \cup B = \{ \ldots \} \]

6. Which elements are not in A?
   \[ A' = \{ \ldots \} \]

7. Which elements are not in B?
   \[ B' = \{ \ldots \} \]

8. How many elements are in A?
   \[ n(A) = \ldots \]

9. How many elements are in B?
   \[ n(B) = \ldots \]

10. How many elements are in A and B?
    \[ n(A \cap B) = \ldots \]
Given \( U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\} \)

\[
A = \{2, 3\} \quad B = \{5, 9, 10\} \quad C = \{1, 2, 3, 4\} \quad D = \{2, 4, 5, 7, 9\}
\]

Make Venn Diagrams for:

- B and D
- A and B
- A and C

Identify these regions by shading or indicating appropriate Roman Numerals:

- \( A \cap B \)
- \( A \cup B \)
- \((A \cup B)’\)

Use regions to determine true or false:

\((A \cap B)’ = A’ \cup B’\)

HW: Read section 2.3. Work Section 2.3, Problems 13, 14, 31-52, 67-73

AND the following handout
Section 2.3 Homework Handout:

Definition: $A \cap B$ is the set of all elements that are common to both sets. $A \cup B$ is the set of all elements that are in either set.

For each pair of sets given below, first find $A \cap B$ then $A \cup B$

1. $A = \{a, b, e, g\}$ $B = \{a, c, d, e\}$
2. $A = \{a, b, e, g\}$ $B = \{b, e, f\}$
3. $A = \{a, c, d, e\}$ $B = \{b, e, f\}$
4. $A = \{1, 3, 5, 7\}$ $B = \{5, 7, 9, 13\}$
5. $A = \{5, 7, 9, 13\}$ $B = \{1, 7, 13\}$
6. $A = \{1, 3, 5\}$ $B = \{1, 3, 5, 7\}$
7. $A = \{1, 3, 5\}$ $B = \{2, 4, 6\}$

$A'$ is the set of all elements of the universe that are NOT in set $A$.

For each pair of sets given below, find $A'$

8. $U = \{a, b, c, d, e, f, g\}$ $A = \{a, c, f\}$
9. $U = \{1, 3, 5, 7, 9\}$ $A = \{3, 7\}$
10. $U = \{@, $, ^, *\}$ $A = \{@, $, ^, *\}$