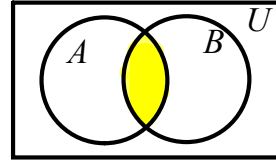


2.3 Notes

2.3: Other Set Operations

Definition: If A and B are sets, the intersection of A and B , denoted $A \cap B$, is the set of elements that are **inboth A and B** . That is,
 $A \cap B = \{x \mid x \in A \text{ and } x \in B\}$.

An intersection can be thought of in the following manner. The shaded region is $A \cap B$:



Examples:

$$\{1, 2, 3, 4\} \cap \{2, 4, 6, 8\} =$$

$$\{x^2 \mid x \in \mathbb{Z}\} \cap \{1, 2, \dots, 20\} =$$

$$\{1, 2\} \cap \{1, 2, 3\} =$$

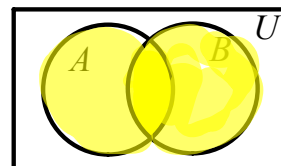
$$\{1, 2\} \cap \{3, 4\} =$$

$$\emptyset \cap \{1, 2\} =$$

Definition: If A and B are sets, the union of A and B , denoted $A \cup B$, is the set of elements that are **ineither A or B** . That is,

$$A \cup B = \{x \mid x \in A \text{ or } x \in B\}.$$

A union can be thought of in the following manner. The shaded region is $A \cup B$:



Examples:

$$\{1, 2, 3, 4\} \cup \{2, 4, 6, 8\} =$$

$$\{x^2 \mid x \in \mathbb{Z}\} \cup \{1, 2, \dots, 20\} =$$

$$\{1, 2\} \cup \{1, 2, 3\} =$$

$$\{1, 2\} \cup \{3, 4\} =$$

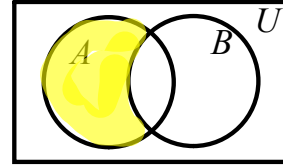
$$\emptyset \cup \{1, 2\} =$$

2.3 Notes

Definition: If A and B are sets, the set difference of B and A (or relative complement of A relative to B), denoted $A - B$ and read " A set minus B ", is the set of elements that are in A but not in B . That is,

$$A - B = \{x \mid x \in A \text{ and } x \notin B\}.$$

A set difference can be thought of in the following manner. The shaded region is $A - B$:



Examples:

$$\{1, 2, 3, 4\} - \{2, 4, 6, 8\} =$$

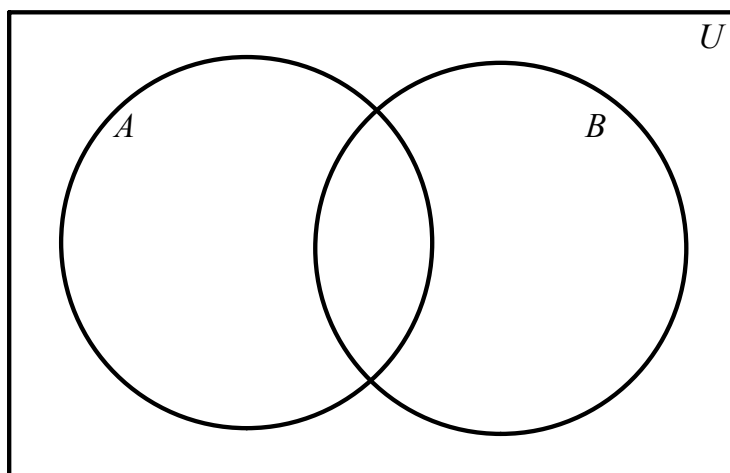
$$\{1, 2, \dots, 20\} - \{x^2 \mid x \in \mathbb{Z}\} =$$

$$\{1, 2\} - \{1, 2, 3\} =$$

$$\{1, 2\} - \{3, 4\} =$$

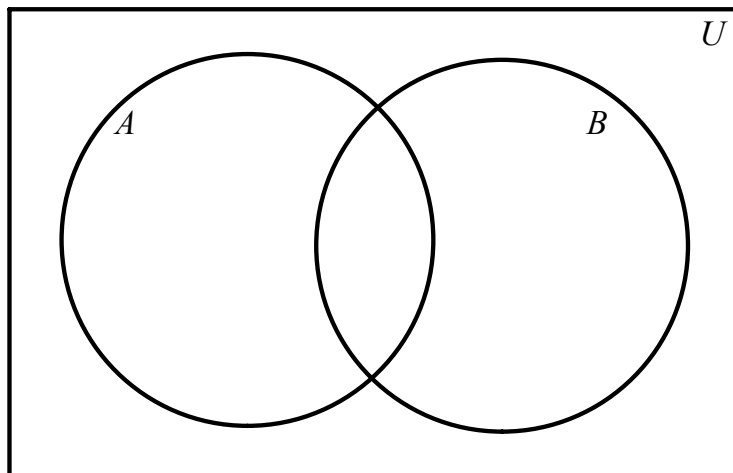
$$\emptyset - \{1, 2\} =$$

Example: Draw the Venn Diagram for $A \cup \overline{B}$.

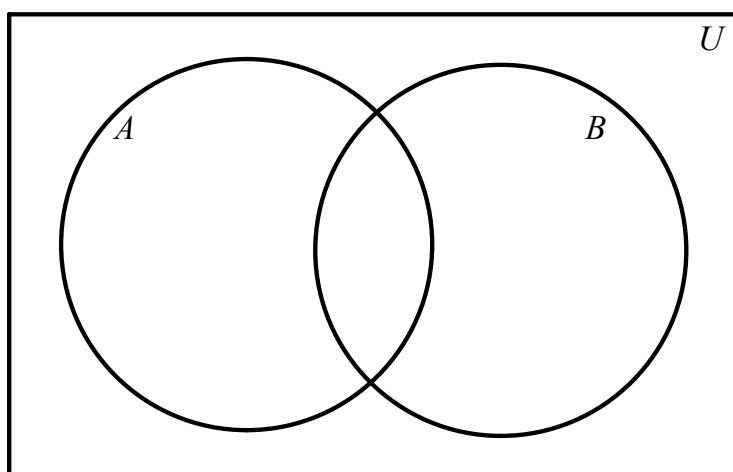


2.3 Notes

Example: Draw the Venn Diagram for $\overline{A} \cup \overline{B}$.

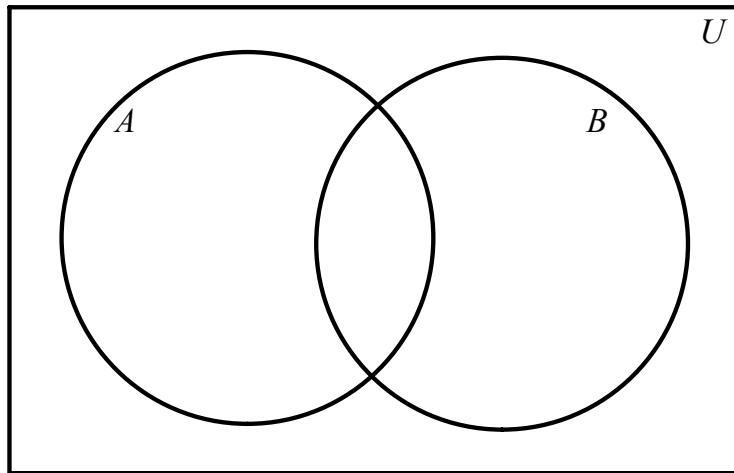


Example: Draw the Venn Diagram for $A \cap \overline{B}$.

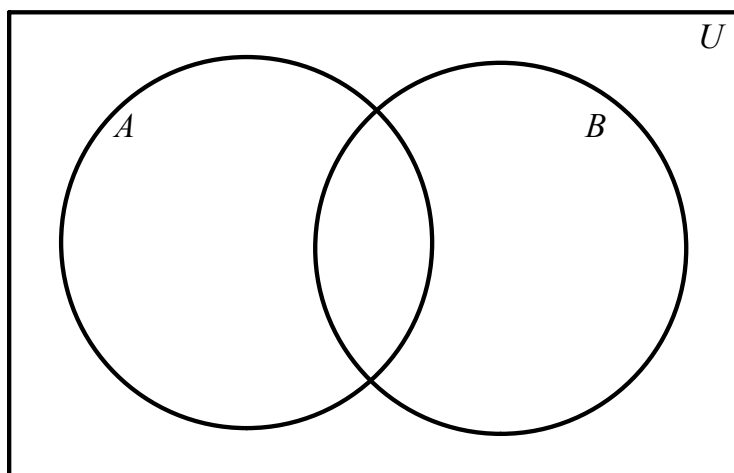


2.3 Notes

Example: Draw the Venn Diagram for $\overline{A} \cap \overline{B}$.

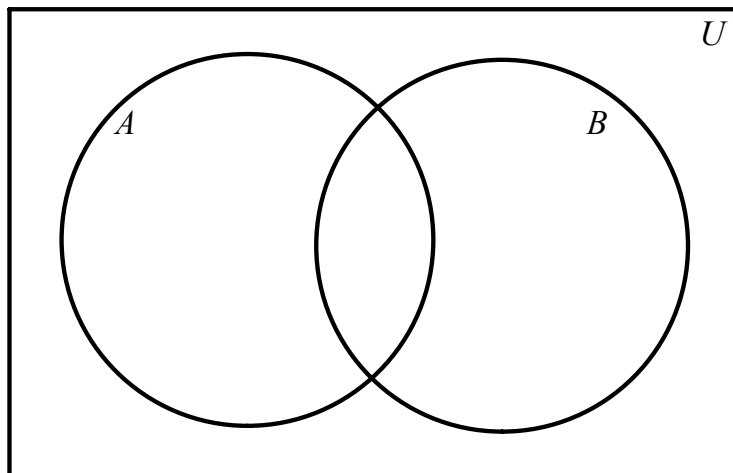


Example: Draw the Venn Diagram for $\overline{A} - B$.

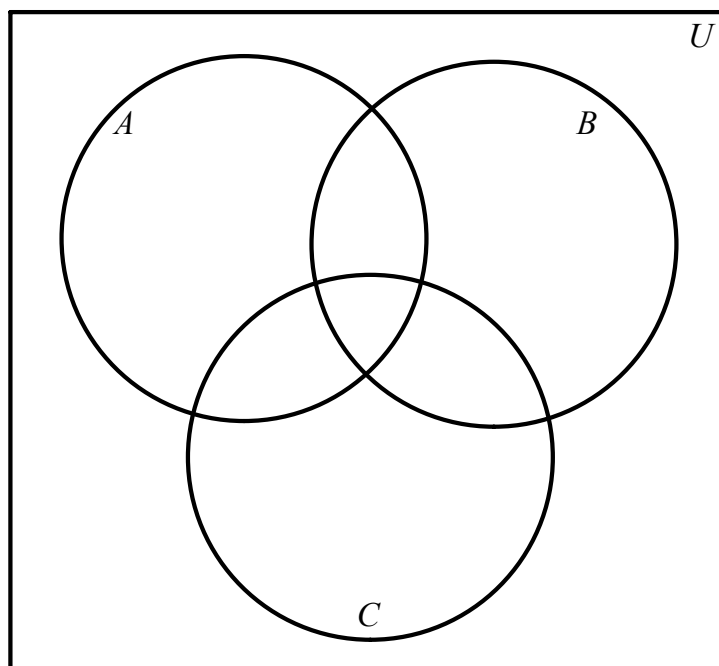


2.3 Notes

Example: Draw the Venn Diagram for $\overline{A - B}$.

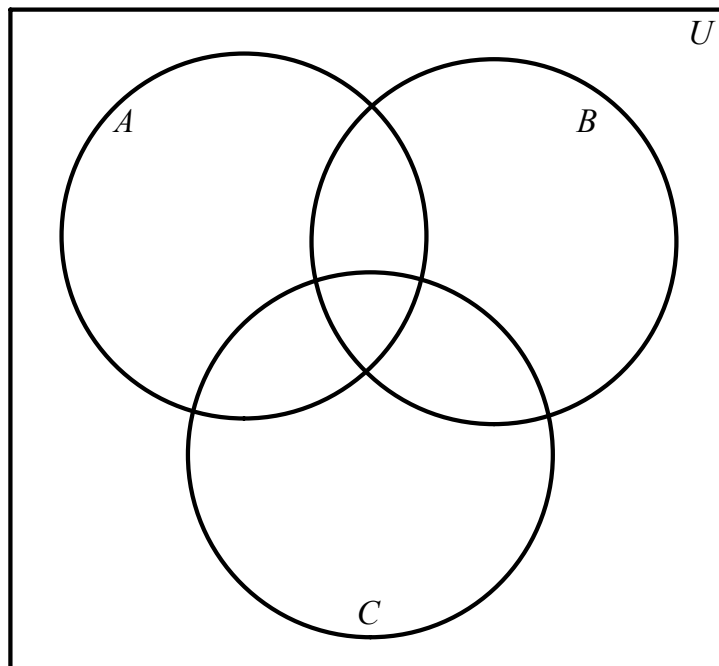


Example: Draw the Venn Diagram for $\overline{(A \cap B)} \cup C$.



2.3 Notes

Example: Draw the Venn Diagram for $(A \cup B) - C$.



Example: Draw the Venn Diagram for $A \cap (\overline{B \cup C})$.

