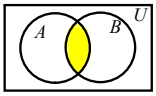
2.3 Notes

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 in **both** 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:

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

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

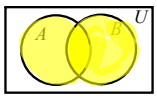
$\{1, 2\} \cap \{1, 2, 3\} =$

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

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

Definition: If A and B are sets, the union of A and B, denoted $A \cup B$, is the set of elements that are in **either** 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:

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

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

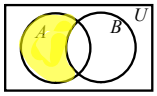
$\{1, 2\} \cup \{1, 2, 3\} =$

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

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

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:

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

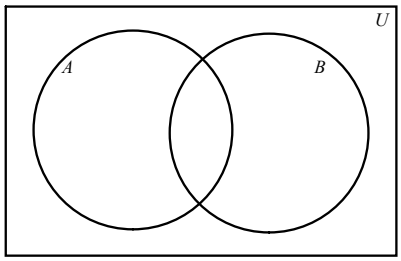
$\{1, 2, ..., 20\} - \{x^2 \mid x \in \mathbb{Z}\} =$

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

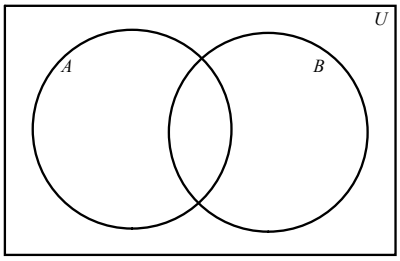
$\{1, 2\} - \{3, 4\} =$

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

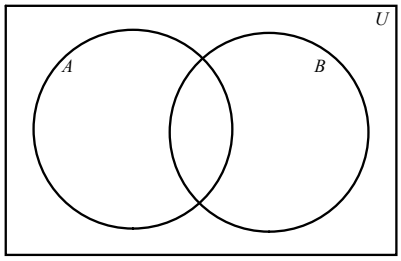
Example: Draw the Venn Diagram for $A \cup \overline{B}$.



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

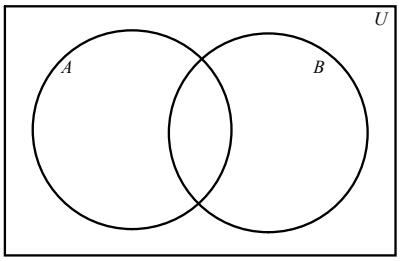


Example: Draw the Venn Diagram for $A \cap \overline{B}$.

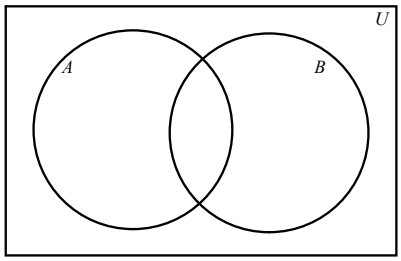


2.3 Notes

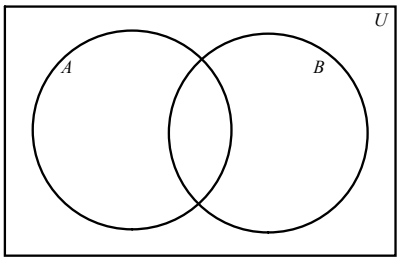
Example: Draw the Venn Diagram for $\overline{A} \cap \overline{B}$.



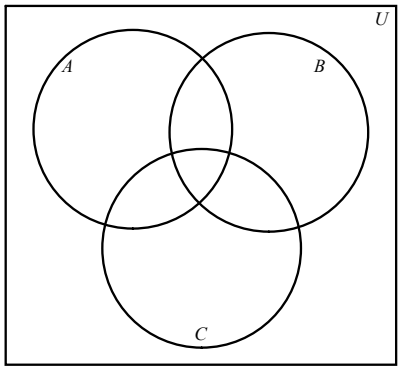
Example: Draw the Venn Diagram for $\overline{A} - B$.



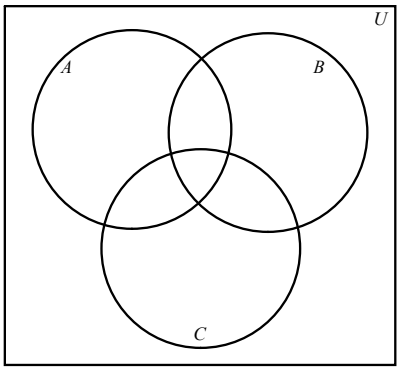
Example: Draw the Venn Diagram for $\overline{A - B}$.



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



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



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