2.6 Set Operations & Compound Inequalities

Intersection of Sets
\[ A \cap B = \{x \mid x \text{ is in } A \text{ and } x \text{ is in } B\} \]

Union of Sets
\[ A \cup B = \{x \mid x \text{ is in } A \text{ or } x \text{ is in } B\} \]

Let \( A = \{1,2,3,4,5,6\} \), \( B = \{1,3,5\} \), \( C = \{1,6\} \) and \( D = \{4\} \)

Specify each set.
\[ B \cap C \]
\[ A \cap \emptyset \]
\[ B \cup D \]
\[ C \cup B \]
A **compound inequality** consists of two inequalities linked by a consecutive word such as *and* or *or*.

**Compound Inequalities with “and”**

\[ x < 5 \text{ and } x > 0 \]

\[ x > 3 \text{ and } x > 6 \]

\[ x < -1 \text{ and } x \geq 3 \]

\[ 7x + 6 \leq 48 \text{ and } -4x \geq -24 \]
Compound Inequalities with “or”

\[ x \geq 1 \text{ or } x \geq 8 \quad \text{ or } \quad x \leq -2 \text{ or } x \leq 6 \]

\[ x + 6 \geq 11 \text{ or } x - 4 \leq 3 \quad \text{ or } \quad x + 1 > 3 \text{ or } x + 4 < 2 \]
3x < x + 12 or 3x – 8 > 10

Express each set in the simplest interval form.

\([-1, \infty) \cap (-\infty, 9]\)

It might help if you draw a number line for each.

\([-1, \infty)\]

\([\infty, 9]\)

What do they have in common?
Write it in interval notation.
[-9,1] U (-∞, -3)