

1.5 COMPOUND INEQUALITIES

1. **Definition:** Compound inequalities – two equalities are separated by the words: **or/and**.

Example:

$$2x + 3 > 7 \text{ and } x < 5$$

$$x + 13 \leq 17 \text{ or } 2x < \frac{5}{3}$$

2. **Solution:**

- a. The solution for **AND** compound inequalities is the solution of **both inequalities**.
- b. The solution for **OR** compound inequalities is the solution of **at least one of the inequalities**.

3. **Definition:** Union and Intersection

- a. The **union** of set A and B, denoted $A \cup B$, is the set of elements that belong to set A or set B or to both of sets A and B.
- b. The **intersection** of set A and B, denoted $A \cap B$, is the set of elements common to both A and B.

Example 1: *Finding the Union and Intersection of Sets:*

Given the sets:

$$A = \{a, b, c, d, e, f\}$$

$$C = \{g, h, i, j, k\}$$

$$B = \{a, c, e, g, i, k\}$$

Find a. $A \cap B$

b. $A \cup B$

c. $A \cup C$

Example 2: Finding the Union and Intersection of two intervals

Given the sets:

$$A = \{x|x < 3\}$$

$$B = \{x|x \geq -2\}$$

$$C = \{x|x \geq 5\}$$

Find a. $A \cap B$

b. $A \cup C$

Example 3: Solving a Compound Inequality: AND/OR

a. $-\frac{2}{3}x \leq 6$ and $-\frac{1}{2}x < 1$

c. $-3y - 5 > 4$ or $4 - y \leq 6$

b. $2 \geq \frac{p-2}{-3} \geq -1$

Example 4: Translating Compound Inequalities:

The length of normal human pregnancy, w , is from 37 to 41 weeks, inclusive.

a. Write an inequality representing the normal length of a pregnancy.

b. Write a compound inequality representing an abnormal length of a pregnancy.