Mini-Lecture 2.5

Compound Inequalities

Learning Objectives:

- 1. Determine the intersection or union of two sets.
- 2. Solve compound inequalities involving "and".
- 3. Solve compound inequalities involving "or".
- 4. Solve problems using compound inequalities.

DEFINITIONS:

- The intersection of two sets A and B, denoted $A \cap B$, is the set of all elements that belong to both set A and set B.
- The union of two sets *A* and *B*, denoted *A* ∪ *B*, is the set of all elements that are in the set *A* or in the set *B* or in both *A* and *B*.
- The word and implies intersection, while the word or implies union.

Preparing for Compound Inequalities:

i) Use set-builder notation and the roster method to represent the set of all integers between -2 and 5.

$$\{x \mid x = -1, 0, 1, 2, 3, 4\}$$

Examples:

1. Use $A = \{-3, -2, -1, 0, 1, 2, 3\}$ and $B = \{0, 2, 4, 6\}$ to find each of the following:

a)
$$A \cap B$$

 $\{0, 2\}$
b) $A \cup B$
 $\{-3, -2, -1, 0, 1, 2, 3, 4, 6\}$

2. Use $C = \{x \mid x \ge -4\}$, $D = \{x \mid x < 1\}$ and $E = \{x \mid x > 2\}$ to graph the solution set of each of the following:





- 3. Solve each compound inequality and graph the solution set.
 - a) $5x + 2 \le 17$ and $-3x 6 \le 0$ $5x \le 15 \cap -3x \le 6$ $x \le 3 \cap x \ge -2$







c)
$$\frac{2}{3}(-6x-12) < 2x \text{ or } 4 \le -\frac{2x+6}{3} \cdot 3$$

 $-4x-8 < 2x \text{ or } 12 \le -(2x+6)$
 $+4x$
 $+4x$
 $-8 < 6x$
 $-8 < 6x$
 $-8 < 6x$
 $-8 < 7x - 6$
 $-8 < 7x - 7x - 7x - 7x$
 $-9 \ge x$

