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 $A \cup B$, 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.

Examples:

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

   a) $A \cap B$

   b) $A \cup B$

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

   a) $C \cap D$

   b) $C \cup E$

   c) $D \cap E$

3. Solve each compound inequality and graph the solution set.

a) $5x + 2 \leq 17$ and $-3x - 6 \leq 0$

b) $7 < 4x + 5 \leq 21$

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