Section 12 Compound Inequalities

Intersections of sets
A and B or $A \cap B$ is the sets of elements that are in both A and in B.

Example 1 Finding the intersection of two sets

Let $A = \{1,2,3,4,5\}$ and $B = \{2,3,4,5,6,7\}$ then $A \cap B = \{2,3,4,5\}$

We can combine inequalities by using the word *and* to connect them. This means we need both inequalities to be true for the whole statement to be true. This forms the **conjunction** of the two inequalities. For example, if we wish to solve $-2 \le 2x - 3$ *and* $2x - 3 < 5$, we can write it as the single inequality $-2 \le 2x - 3 < 5$.

Example 2 Solving an extended inequality

Solve $-2 \le 2x - 3$ *and* $2x - 3 < 5$ by
a) Solving the two inequalities separately, graphing the two solutions, and finding the intersection of the two solutions
b) Solve $-2 \le 2x - 3 < 5$ directly by isolating *x* in the middle.

Example 3 **Solving a compound inequality**

Solve $2x - 5 \geq 3$ and $2x - 5 \geq 3$

Union of sets
A or B ($A \cup B$) is the sets of elements that are in A or in B or in both A and B.

Example 4 **Finding the union of two sets**

Let $A = \{1,2,3,4,5\}$ and $B = \{2,3,4,5,6,7\}$ then $A \cup B =$

We can combine inequalities by using the word *or* to connect them. This means we need one of inequalities to be true for the whole statement to be true. This forms the **disjunction** of the two inequalities.

Example 5 Solving a compound inequality

Solve $3x + 2 \leq -4$ *or* $3 - 2x < 5$ by solving the two inequalities separately, graphing the two solutions, and finding the union of the two solutions.

Interval Notation and Domains

Example 6 Writing Domains using Interval Notation

Use interval notation to write the domain of each of the following functions.

a. $f(x) = \sqrt{x - 2}$

b. $g(x) = \sqrt{2 - 3x}$

c. $h(x) = \dfrac{1}{2x - 3}$