

1 1.5 Inequalities

Solving First-Degree Inequalities

Example 1 Find the solution set of the following Inequality: $x + 1 > 4$

Equivalent Inequalities have the same solution set

Properties of Inequalities

1) Addition Inequality

$a < b$ and $a + c < b + c$ are equivalent inequalities

2) Multiplication Property

a) If $c > 0$, then $a < b$ and $ac < bc$ are equivalent inequalities

b) If $c < 0$, then $a < b$ and $ac > bc$ are equivalent inequalities

Example 2 $-2b < 6$ and $b > -3$ are equivalent inequalities

Example 3 Find the solution set of the following inequality: $3x + 10 > 7(x - 2)$ (ans: $\{x | x < 6\}$)

Compound Inequalities (Joining two inequalities with the connective word and or or)

Example 4 Find the solution set of the following compound inequalities: 1) $2x < 10$ or $x + 1 > 9$ 2) $x + 3 > 4$ and $2x + 1 > 15$

3) $3 < 2x + 1 < 11$.

Absolute Value Inequalities

If $k > 0$, then 1) $|E| \leq k$ if and only if $-k \leq E \leq k$. 2) $|E| \geq k$ if and only if $E \leq -k$ or $E \geq k$.

Example 5 Find the solution set of the following inequalities: 1) $|3x - 2| \leq 4$ (ans: $[-\frac{2}{3}, 2]$) 2) $|2x + 5| > 3$ (ans: $(-\infty, -4) \cup (-1, \infty)$)

Solving Inequalities by the Critical Value Method

1) Write the inequality in the form $() () < 0$ 2) Find the critical values (the real zeros of the expression) 3) Use test values and the sign diagram.

Example 6 Find the solution set of the following inequality: $x^2 - 2x - 15 < 0$.

Rational Inequalities

1) Write the inequality in the form $\frac{()}{()} < 0$ 2) Find the critical values (the real zeros of the numerator and the denominator) 3) Use test values and the sign diagram.

Example 7 Find the solution set of the following inequality: $\frac{3x+4}{x+1} \leq 2$.