

Topic 5: Quadratic Inequalities

Solving Linear Inequalities

The same rules apply as when we solve linear equations.

Note: When you multiply or divide across by a negative you must change the direction of the inequality.

Example: Solve the following 1. $2x - 10 \geq 15 - 3x$

2. $-6 < 3x + 3 \leq x + 9$



$\begin{aligned} \underline{1.} \quad 2x - 10 &\geq 15 - 3x \\ 2x + 3x &\geq 15 + 10 \\ 5x &\geq 25 \\ x &\geq 5 \end{aligned}$	$\begin{aligned} \underline{2.} \quad \text{split} \\ -6 &< 3x + 3 \\ -9 &< 3x \\ -3 &< x \end{aligned}$	$\begin{aligned} 3x + 3 &\leq x + 9 \\ 3x - x &\leq 9 - 3 \\ 2x &\leq 6 \\ x &\leq 3 \end{aligned}$
$-3 < x \leq 3 \quad \checkmark$		

Solving Quadratic Inequalities

Sketching the quadratic is helpful. Bring all the terms to one side and solve to find the roots of the quadratic.

Example: Solve the following 1. $x^2 + 3x - 18 \geq 0$

2. $x^2 - x - 8 < 4$

$\begin{aligned} \underline{1.} \quad x^2 + 3x - 18 &\geq 0 \\ (x + 6)(x - 3) &\geq 0 \\ \text{put } (x + 6)(x - 3) &= 0 \\ x = -6 \quad x = 3 \\ \text{sketch} \end{aligned}$  <p>we want above axis as ≥ 0 $x \leq -6, x \geq 3.$</p>	$\begin{aligned} \underline{2.} \quad x^2 - x - 8 &< 4 \\ x^2 - x - 12 &< 0 \\ (x - 4)(x + 3) &< 0 \\ \text{put } (x - 4)(x + 3) &= 0 \\ x = 4 \quad x = -3 \\ \text{sketch} \end{aligned}$  <p>we want below axis as < 0 $-3 < x < 4$</p>
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