

02 Quadratic Inequalities I

Wednesday, November 28, 2018 8:10 AM



02 Quadrati...

Quadratic Inequalities



Be good at recognizing a quadratic equation. They are all polynomials of degree 2 (two is the highest power). There are 4 inequality symbols.

$$ax^2 + bx + c < 0 \text{ or } ax^2 + bx + c \leq 0 \text{ or } ax^2 + bx + c > 0 \text{ or } ax^2 + bx + c \geq 0$$

We have a number of strategies to solve these.

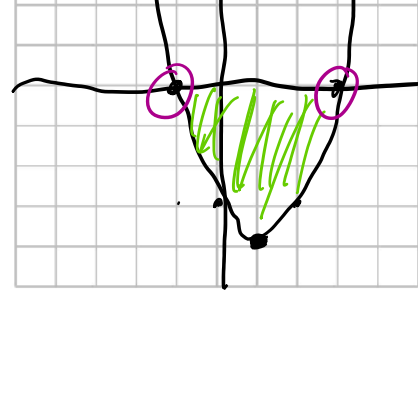
#1- We solve graphically - just like with the linear versions
With one extra step.

Eg: $x^2 - 2x - 3 \leq 0$

$$(x-1)^2 - 1 - 3 \leq 0$$

$$(x-1)^2 - 4 \leq 0$$

$$\{x \mid -1 \leq x \leq 3, x \in \mathbb{R}\}$$



Once we have it graphed, we need to know which portion of the parabola is a solution to our inequality.

Our inequality is asking for all of the points that cause $x^2 - 2x - 3$ to be ≤ 0 .

We can use test points (3 in this case to confirm our intuition) and we must also decide if we are to use $(\circ, \text{ or } \bullet)$.

Answer is a solution set:

$$\{x \mid -1 \leq x \leq 3, x \in \mathbb{R}\}$$

Eg2:

$$x^2 - 4x > -3$$

Complete the square	$x^2 - 4x + 3 > 0$ $(x-2)^2 - 4 + 3 > 0$ $(x-2)^2 - 1 > 0$
Graph	
Which part of the parabola is a solution?	
$(\circ, \text{ or } \bullet)$	$(-\infty, -1) \cup (3, \infty)$
Solution Set	$\{x \mid x < -1, x > 3, x \in \mathbb{R}\}$

Method 2: Solve Algebraically

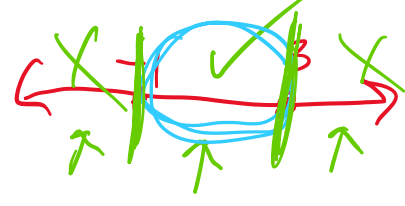
- Factor
 - ◆ In order to find the roots (zeroes)
- Put the points on a number line
- Test your intervals
- Write the solution set

Eg: $x^2 - 2x - 3 \leq 0$

$$(x-3)(x+1) \leq 0$$

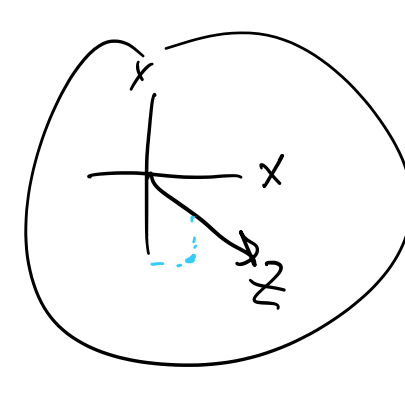
$$x = 3, -1$$

$$\{x \mid -1 \leq x \leq 3, x \in \mathbb{R}\}$$



Eg: $-x^2 + x + 12 < 0$

Solve.



$$\rightarrow x^2 - x - 12 > 0$$

$$(x-4)(x+3) > 0 \quad x = 4, -3$$



$$\{x \mid x < -3, 4 < x, x \in \mathbb{R}\}$$

Eg:

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$$\text{Hint: } 2x^2 - 3x > 2$$

$$\{x \mid x < -\frac{1}{2}, 2 < x, x \in \mathbb{R}\}$$

HW: 9.2 # 3, 4, 7, 8, 9, 11, 12

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