

Algebra 2 Notes

Name: Key

Section 4.8 - Solving Quadratic Inequalities

A quadratic inequality in two variables can be written in one of the following forms, where a , b , and c are real numbers and $a \neq 0$. Its solution set is a set of ordered pairs (x, y) .

$$y < ax^2 + bx + c$$

$$y > ax^2 + bx + c$$

$$y \leq ax^2 + bx + c$$

$$y \geq ax^2 + bx + c$$

Example 1: Graph each quadratic inequality.

a. $y < -2x^2 - 4x + 6$

y-int: 6
opens down
vertex: $x = \frac{4}{-4} = -1$ $x = -1$
 $y = -2(1) + 4 + 6 = 8$ $(-1, 8)$

Test $(0, 0)$:
 $0 < 0 - 0 + 6$
 $0 < 6$
yes!

b. $y \geq 2x^2 - 5x - 2$

y-int: -2
opens up
vertex: $x = \frac{5}{4} = 1.25$ $x = 1.25$
 $y = -5.125$ $(1.25, -5.125)$

Test $(0, 0)$:
 $0 \geq 0 - 0 - 2$
 $0 \geq -2$
yes!

NOTE: Will not always shade inside curve!

Quadratic inequalities in one variable, such as $ax^2 + bx + c > 0$ where $a \neq 0$ have solutions in one variable that are graphed on a number line.

Example 2: Solve each inequality by using tables or graphs.

a. $x^2 - 6x + 8 \leq 3$

$y_1 = x^2 - 6x + 8$
 $y_2 = 3$

$1 \leq x \leq 5$ OR $[1, 5]$

b. $x^2 - x + 5 > 7$

y_1 y_2

$x < -1$ OR $x > 2$
OR
 $(-\infty, -1) \cup (2, \infty)$

c. $2x^2 - 5x + 1 < 1$

y_1 y_2

$0 < x < 2.5$
OR
 $(0, 2.5)$

Example 3: Solve each inequality by using algebra.

a. $x^2 - 4x + 1 > 6$

$$x^2 - 4x - 5 > 0$$

$$(x-5)(x+1) > 0$$



-2	0	6
↑	↑	↑
$4 + 8 + 1 > 6$	$0 - 0 + 1 > 6$	$36 - 24 + 1 > 6$
$13 > 6$	$1 > 6$	$13 > 6$
yes	no	yes

$$x < -1 \text{ OR } x > 5$$

b. $x^2 - 6x + 10 \leq 2$

$$x^2 - 6x + 8 \leq 0$$

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



0	3	5
↑	↑	↑
$0 - 0 + 10 \leq 2$	$9 - 18 + 10 \leq 2$	$25 - 30 + 10 \leq 2$
$10 \leq 2$	$1 \leq 2$	$-5 \leq 2$
no	yes	no

$$2 \leq x \leq 4$$

c. $x^2 \geq 16$

$$x^2 - 16 \geq 0$$

$$(x-4)(x+4) \geq 0$$



-5	0	4
↑	↑	↑
$25 \geq 16$	$0 \geq 16$	$25 \geq 16$
yes	no	yes

$$x \leq -4 \text{ OR } x \geq 4$$

c. $-2x^2 + 3x + 7 < 2$

$$-2x^2 + 3x + 5 < 0$$

$$-(2x^2 - 3x - 5) < 0$$

$$-(2x-5)(x+1) < 0$$



-2	0	3
↑	↑	↑
$-8 - 6 + 7 < 2$	$7 < 2$	$-18 + 9 + 7 < 2$
$-7 < 2$	no	$-2 < 2$
yes		yes

$$x \leq -1 \text{ OR } x \geq \frac{5}{2}$$