3.4 - Using the Quadratic Formula

Warmup -

Find the quadratic that has this solution.

$$x = \frac{-1 \pm \sqrt{17}}{5}$$

$$y = 25x^2 + 10x - 16$$

3.1 - Solving Quadratic Equations

$$\frac{1}{x+1}+\frac{1}{x-1}=1$$

$$x=1\pm\sqrt{2}$$

$$\frac{1}{x+2}+\frac{1}{x+6}=1$$

$$x=-3\pm\sqrt{5}$$

3.1 - Solving Quadratic Equations

$$\sqrt{x+3} = 2x$$

$x = 1$

-3/4 is extraneous!!!

$$\sqrt{x-4} - \frac{2}{\sqrt{x-4}} = 1$$

$x = 8$

5 is extraneous!!!

3.1 - Solving Quadratic Equations

$$\frac{x+1}{x^2+6x+8}+\frac{1}{x+2}=1 \quad x=\{-3,-1\}$$

$$\frac{2}{x-4}-\frac{6}{x^2-5x+4}=\frac{x}{x-1} \quad x=\{2\}$$ **4 is extraneous!!!**

Chapter 3
Quadratic Equations and Complex Numbers

1. Solving Quadratic Equations
2. Complex Numbers
3. Completing the Square
4. Using the Quadratic Formula
5. Solving Nonlinear Systems
6. **Quadratic Inequalities**

3.6 - Quadratic Inequalities

$y < ax^2 + bx + c$ $\qquad$ $y > ax^2 + bx + c$

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

Graphing a Quadratic Inequality in Two Variables

To graph a quadratic inequality in one of the forms above, follow these steps.

Step 1 Graph the parabola with the equation $y = ax^2 + bx + c$. Make the parabola *dashed* for inequalities with $<$ or $>$ and *solid* for inequalities with $\leq$ or $\geq$.

Step 2 Test a point (x, y) inside the parabola to determine whether the point is a solution of the inequality.

Step 3 Shade the region inside the parabola if the point from Step 2 is a solution. Shade the region outside the parabola if it is not a solution.

3.6 - Quadratic Inequalities

Graph the inequality

$$y < -x^2 - 2x - 1$$

vertex = (-1, 0)

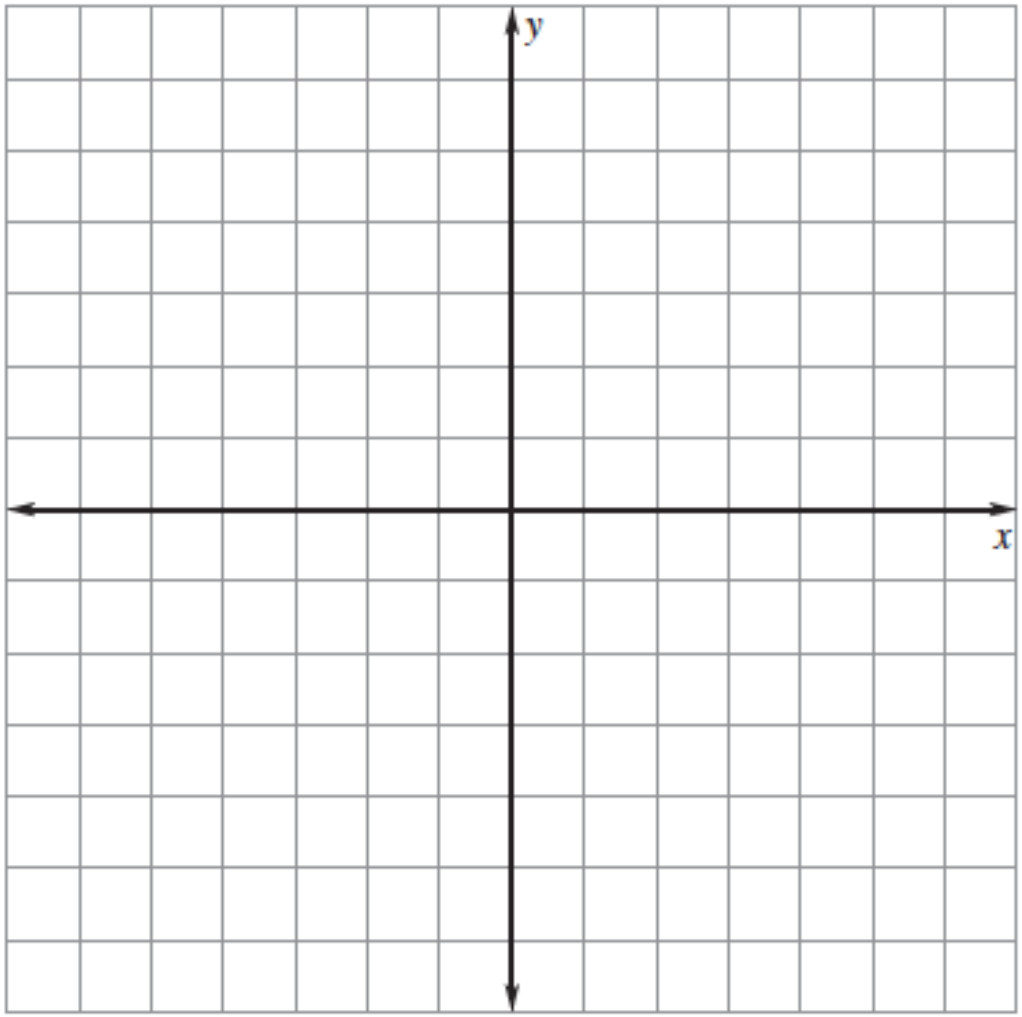
intercepts = -1

axis of symmetry

x = -1

domain all real

range y <= 0



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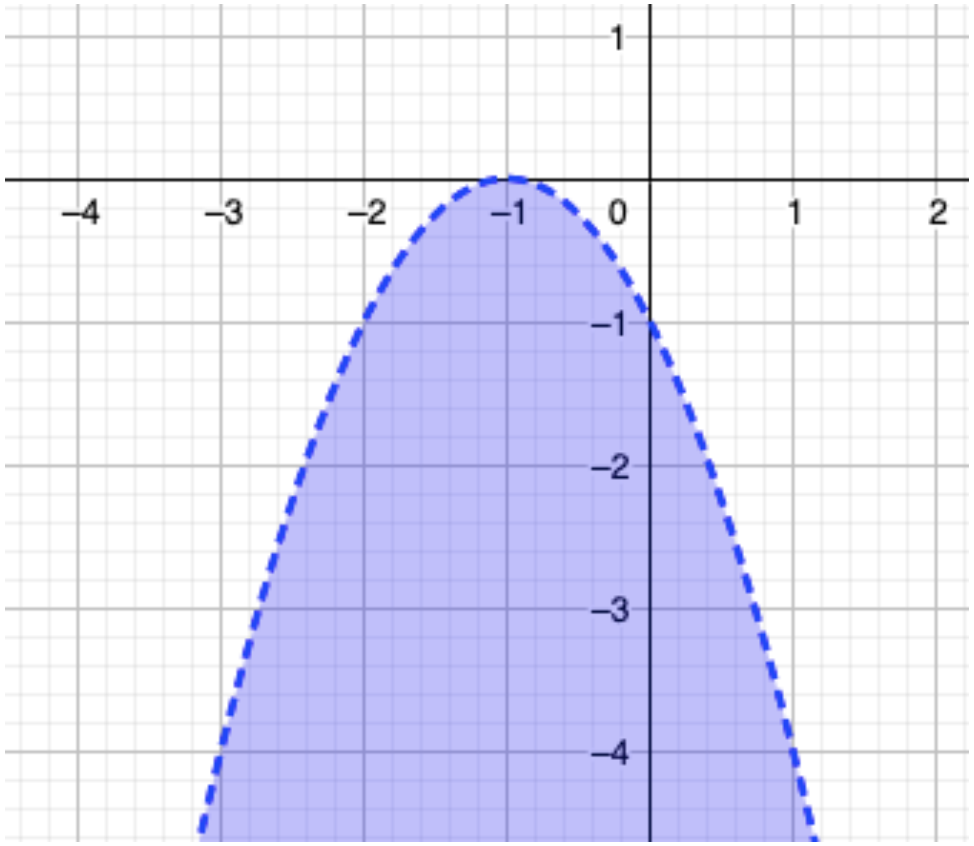


3.6 - Quadratic Inequalities

Graph the inequality

$$y - 1 > -(x - 2)^2$$

vertex = (2, 1)

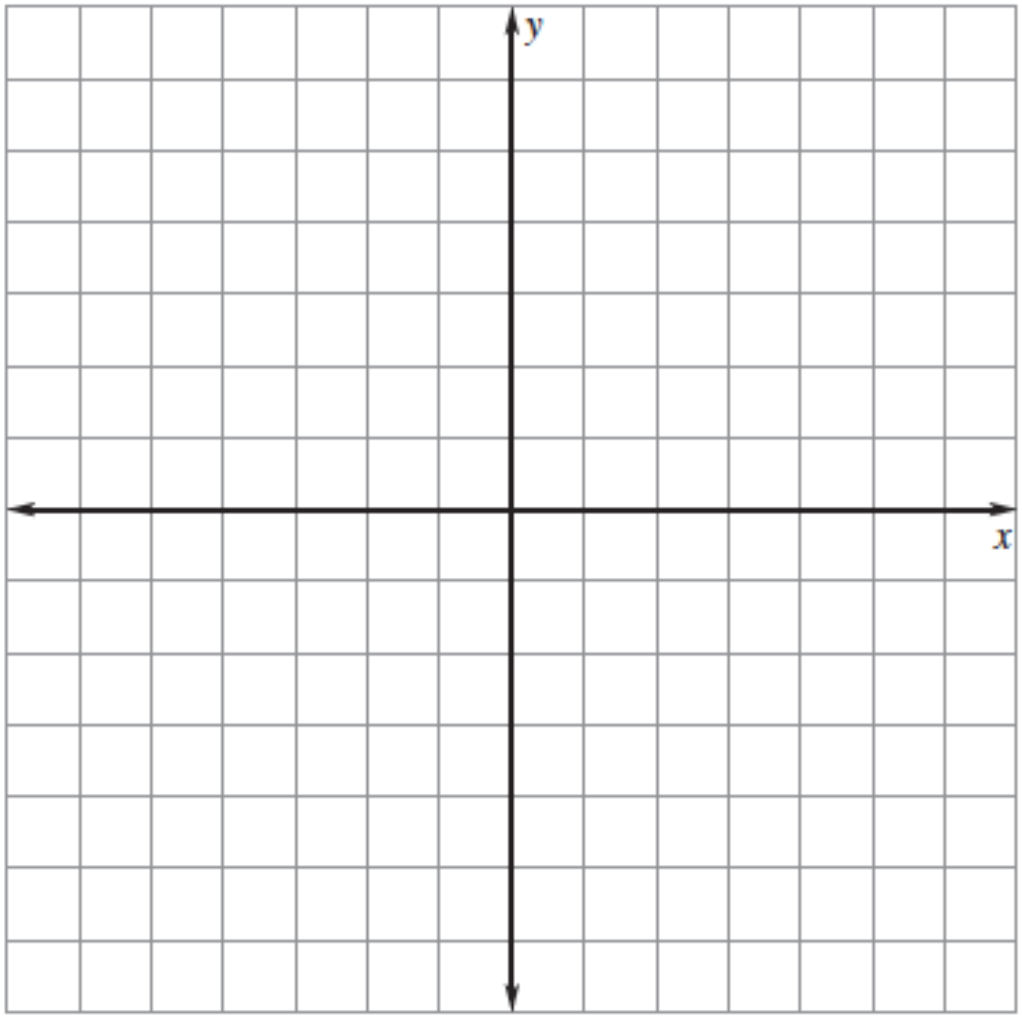
intercepts = {1, 3}

axis of symmetry

x = 2

domain all real

range y <= 1



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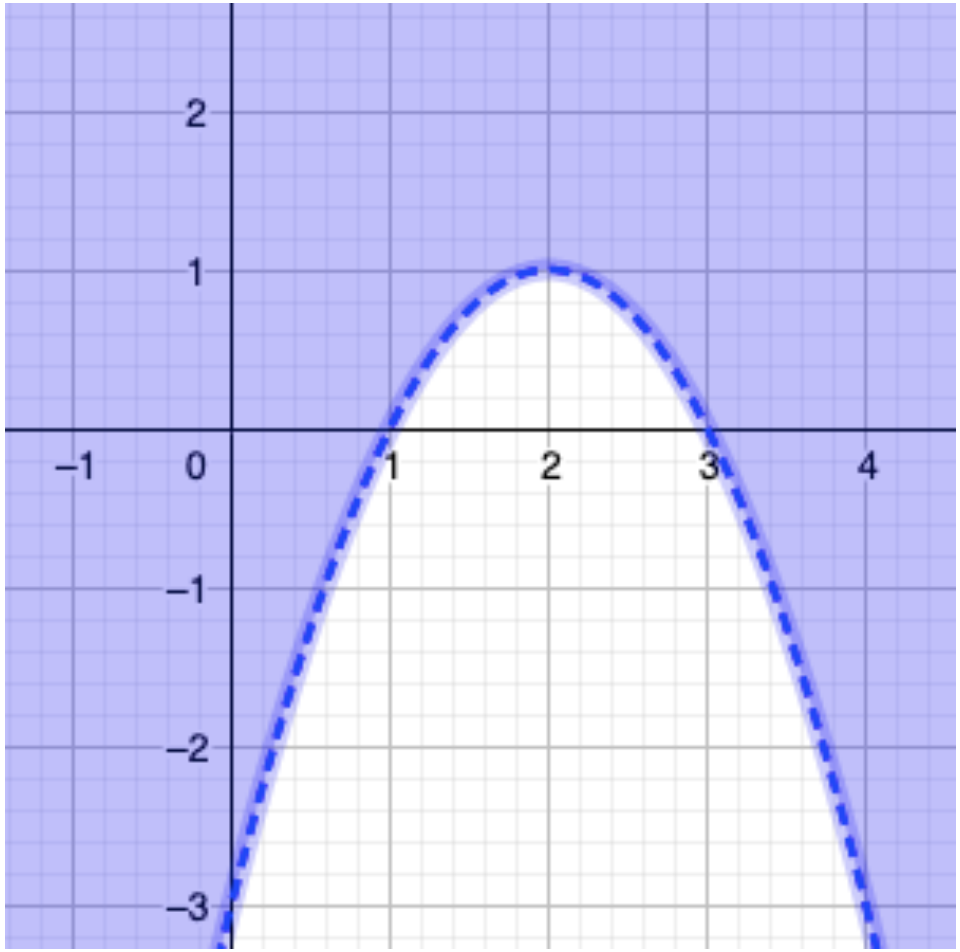
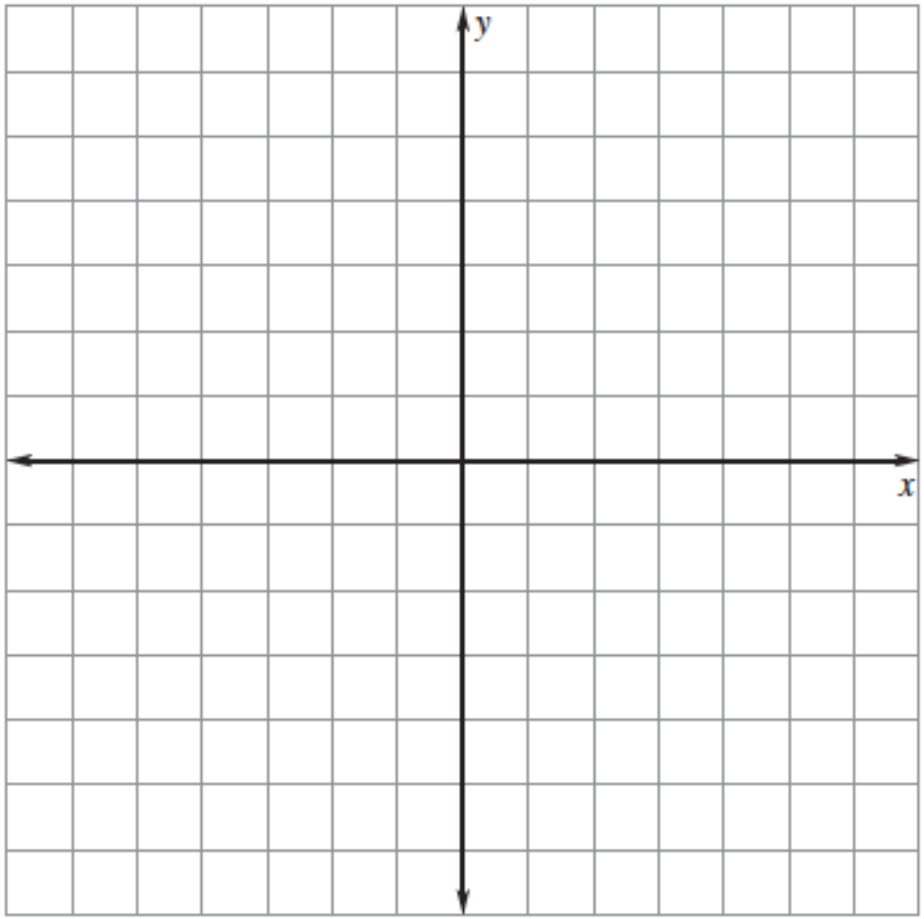


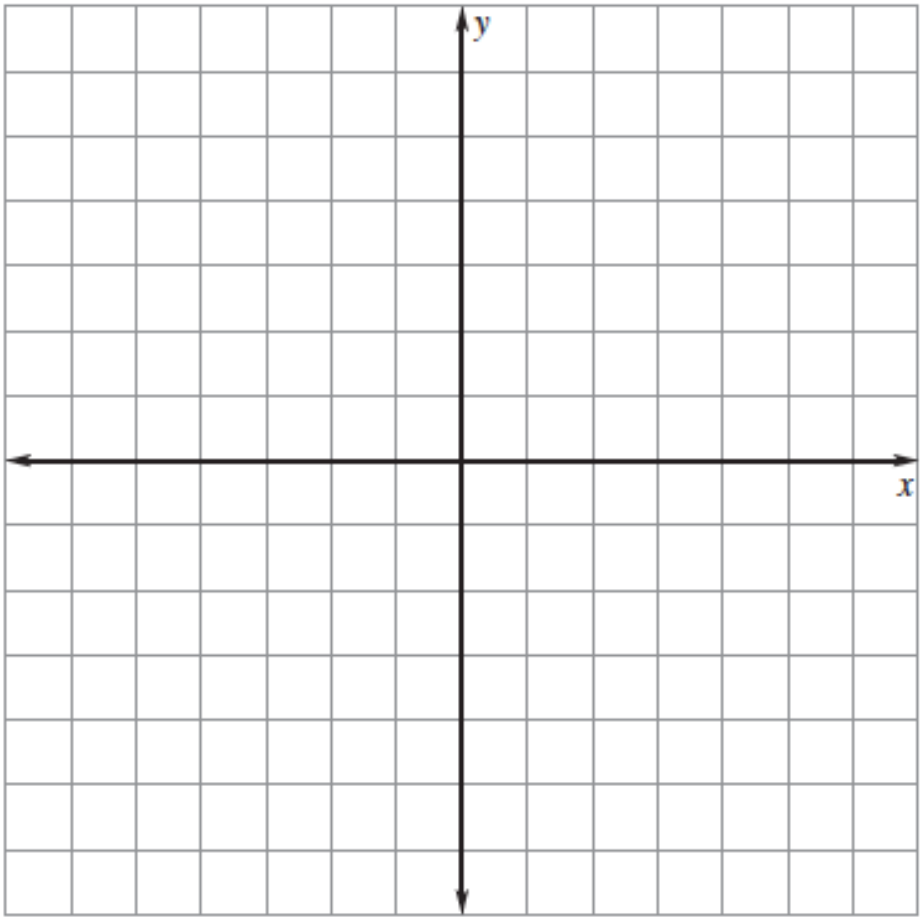
3.6 - Quadratic Inequalities

Graph the inequality

$$y - 1 \geq 2(x - 3)^2$$



$$y + 2 < -3(x + 1)^2$$



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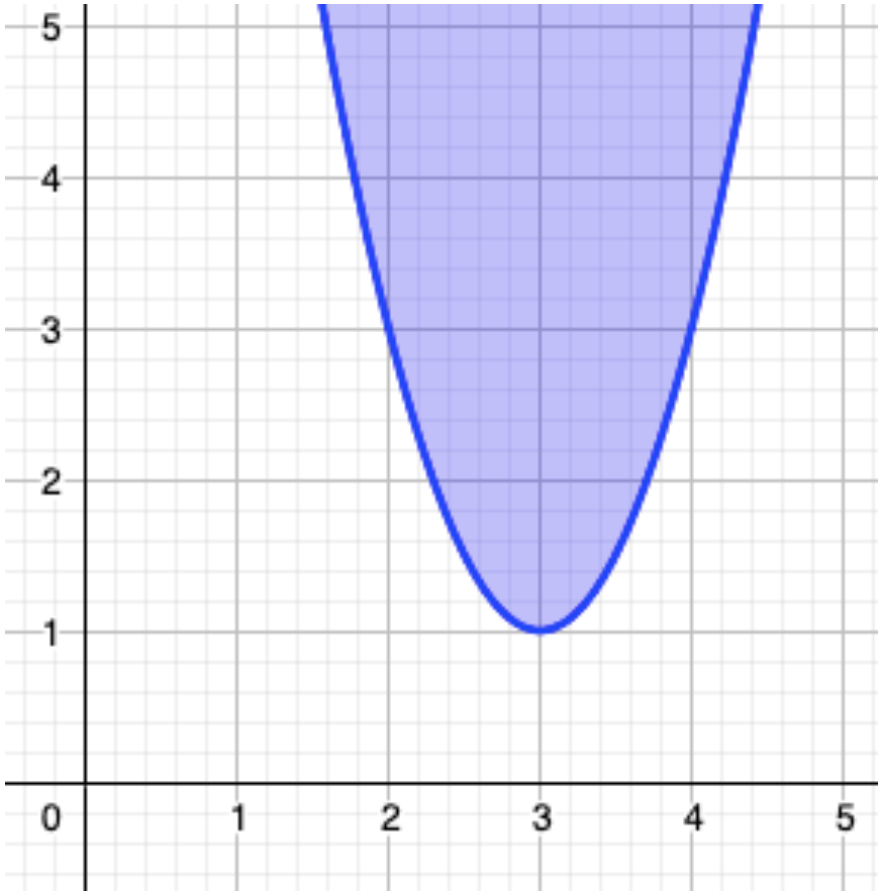

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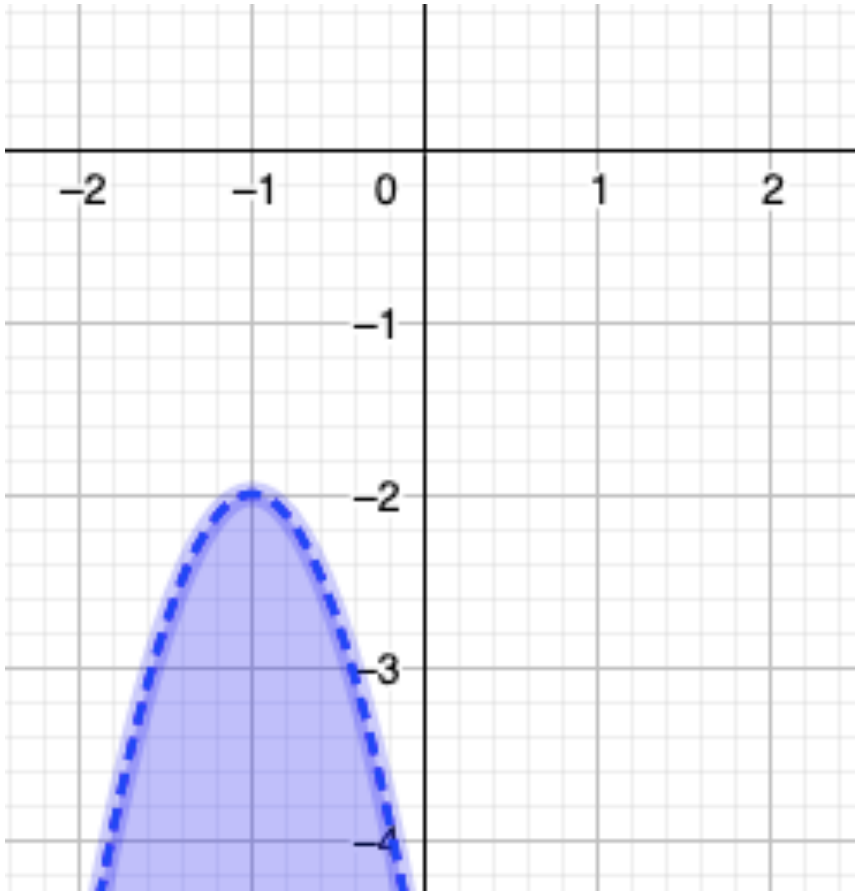
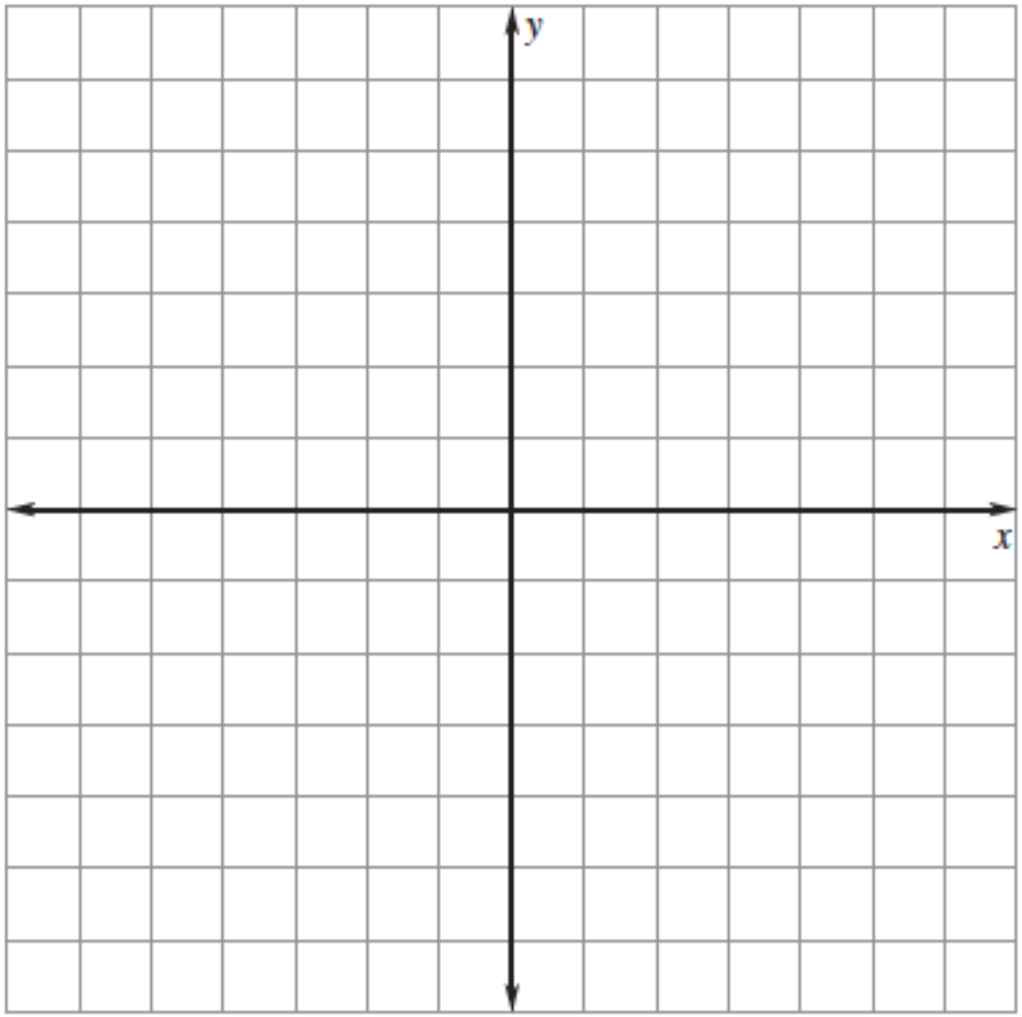


3.6 - Quadratic Inequalities

Graph the system of quadratic inequalities

$$y < -x^2 + 3$$

$$y \geq x^2 + 2x - 3$$



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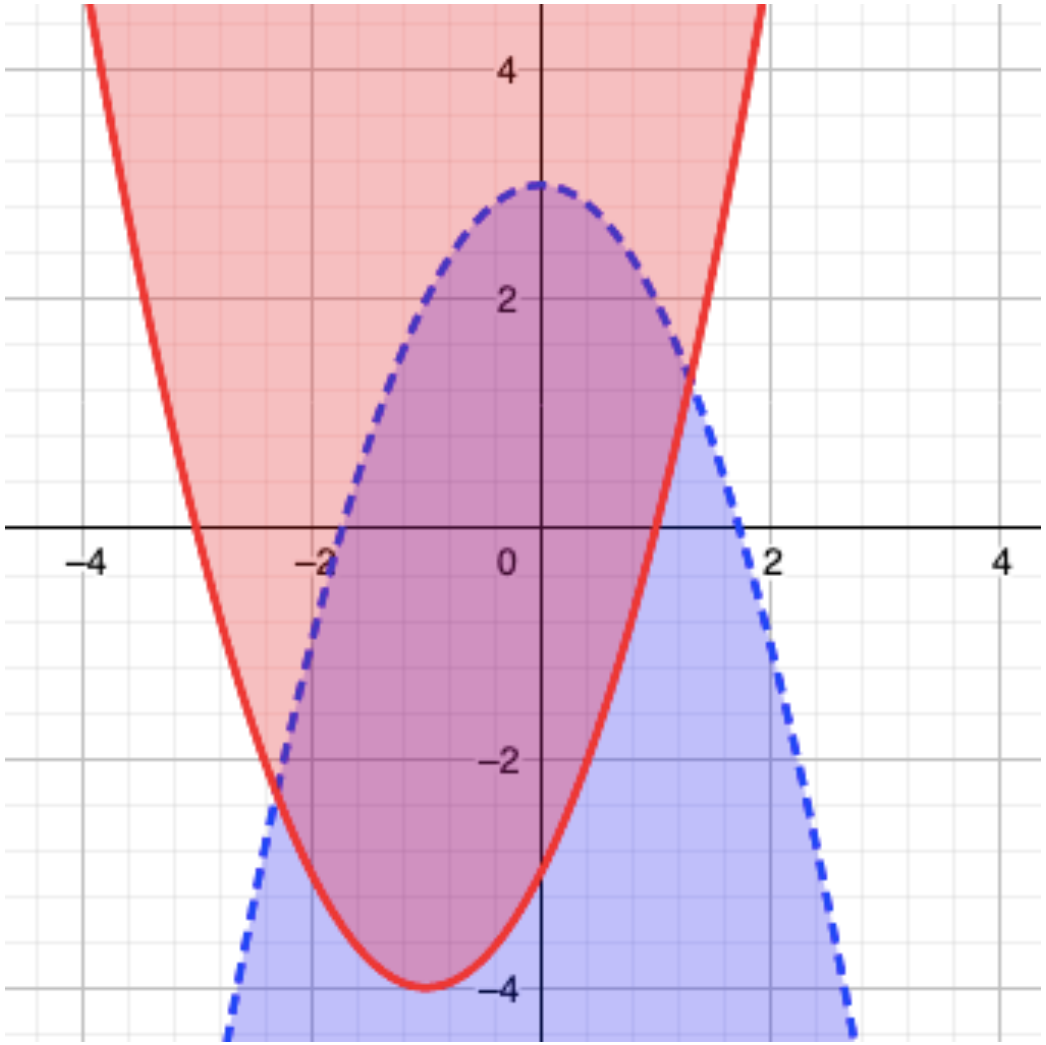
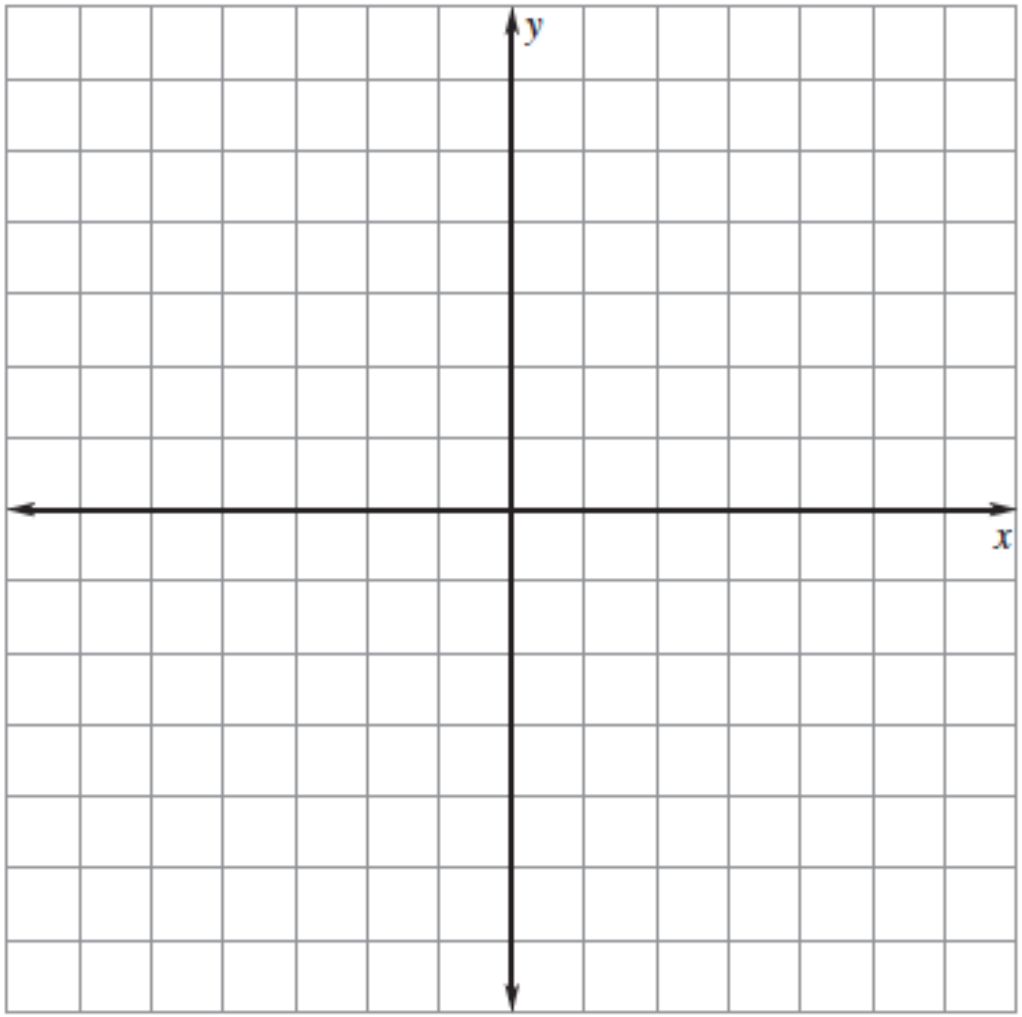


3.6 - Quadratic Inequalities

Graph the system of quadratic inequalities

$$y + 2 \geq (x + 1)^2$$

$$y - 1 > -(x + 2)^2$$



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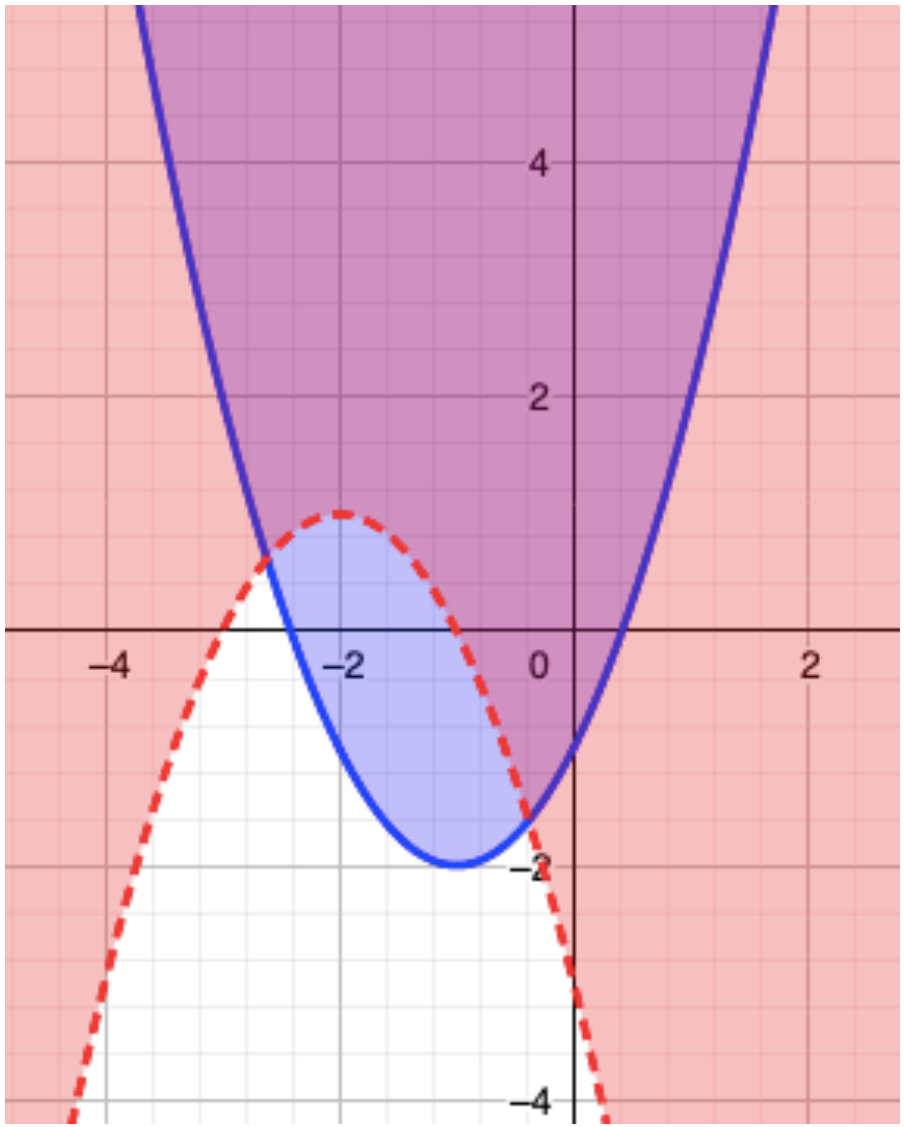
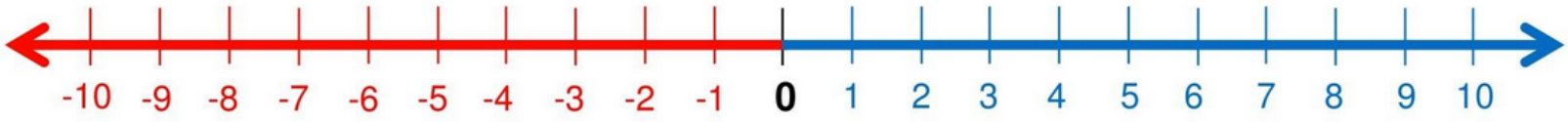


3.6 - Quadratic Inequalities

Solve the inequality algebraically

$$x^2 + 4x - 32 > 0$$

$$x < -8 \text{ or } x > 4$$

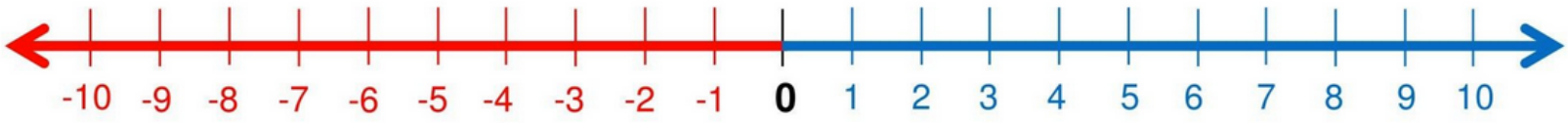


3.6 - Quadratic Inequalities

Solve the inequality algebraically

$$(x-7)(x-3)(x+1)(x+4) \geq 0$$

$x \leq -4$ *or* $-1 \leq x \leq 3$ *or* $x \geq 4$



3.6 - Quadratic Inequalities

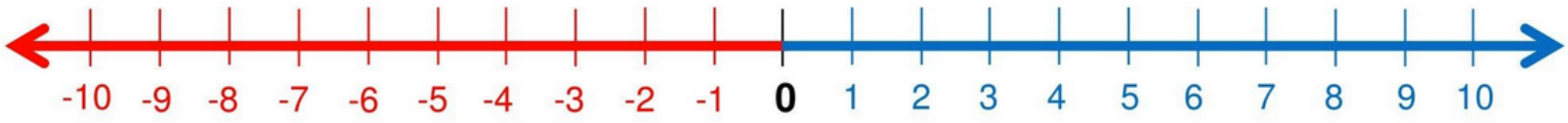
Solve the inequality algebraically

$0 > (x-1)(x+3)$

$-3 < x < 1$

$0 \geq -2x^2 + 3x - 1$

$x \leq \frac{1}{2} \text{ or } x \geq 1$



3.6 - Quadratic Inequalities

Solve the inequality algebraically (special!!)

$0 > (x-1)^2 + 3$

$0 \geq -(x^2 + 2) - 3$