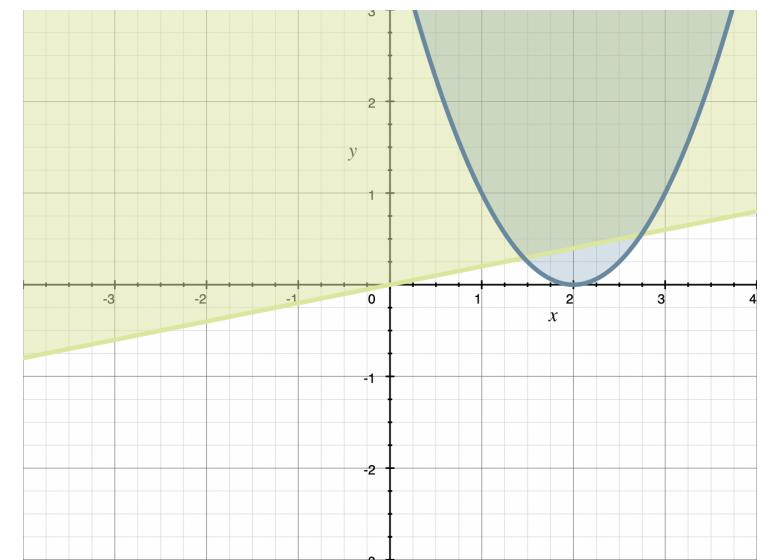
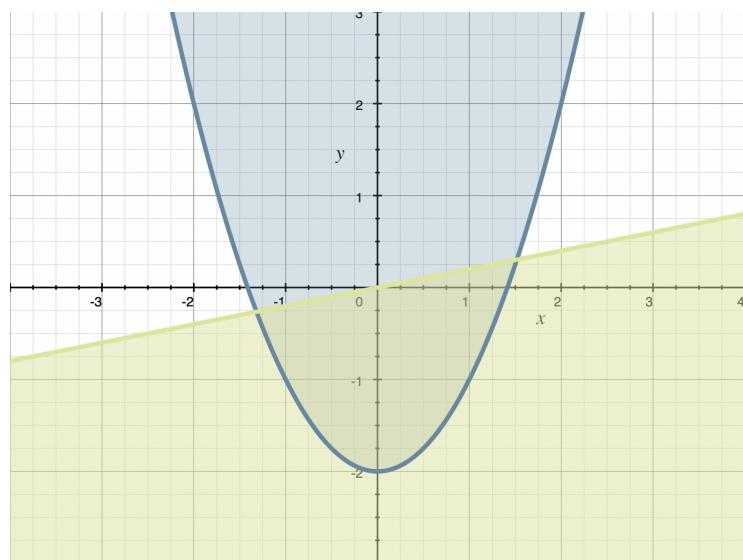
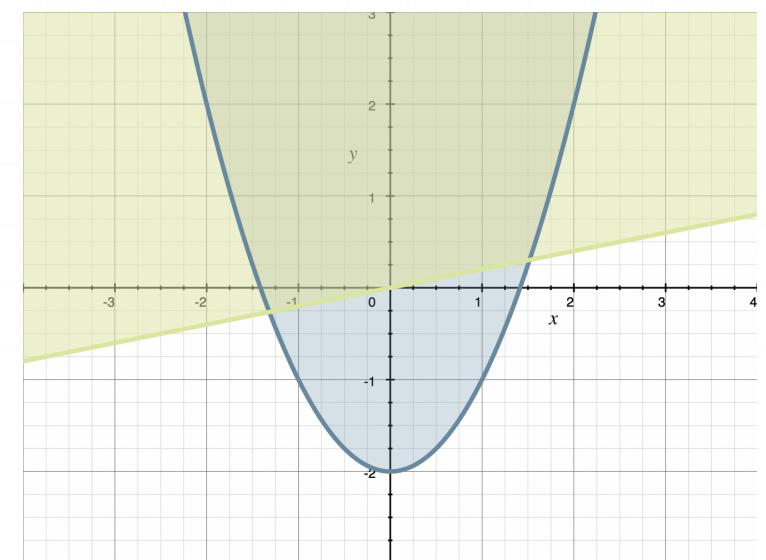
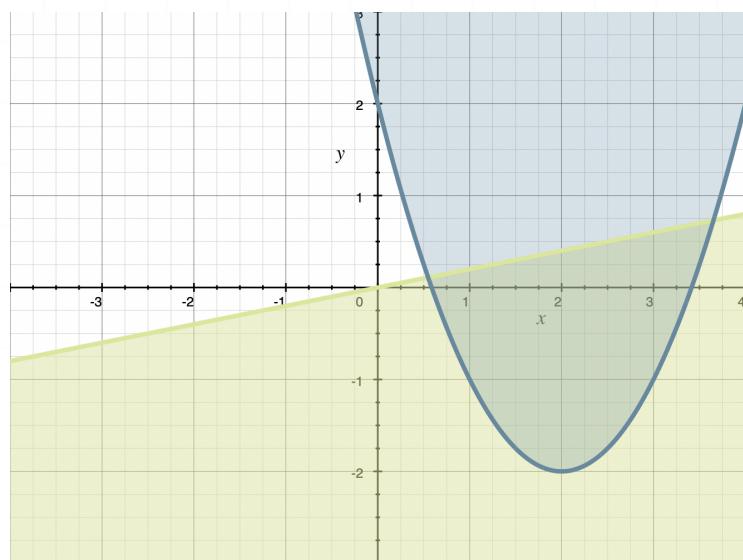


**Topic:** Systems with quadratic inequalities**Question:** Sketch the solution to the system of inequalities.

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

$$x \leq 5y$$

**Answer choices:**

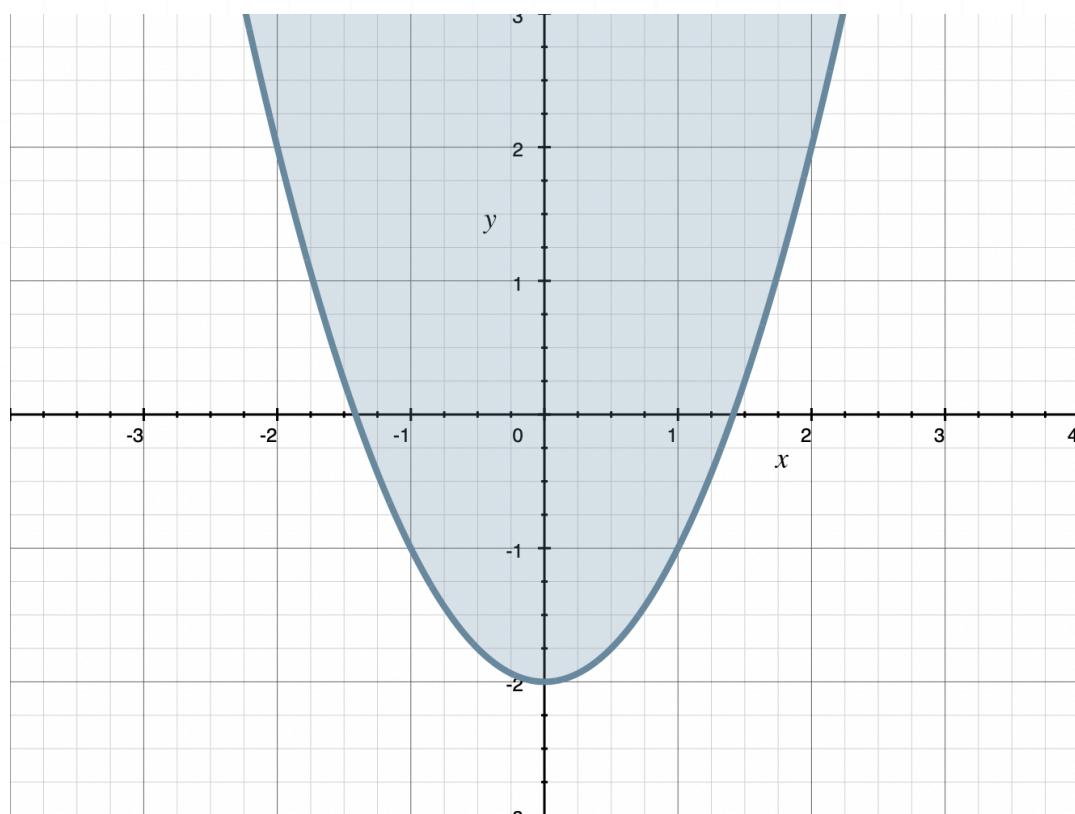
**Solution: B**

Let's consider the first inequality.

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

The graph of this inequality has a solid boundary curve, which is the parabola  $y = x^2 - 2$ . The parabola's vertex is at  $(0, -2)$  and it opens up. The  $x$ -intercepts are at  $x^2 - 2 = 0$ , or  $x = \pm\sqrt{2}$ .

Substitute  $(0,0)$  into the inequality to get  $0 \geq -2$  and therefore shade towards the origin.



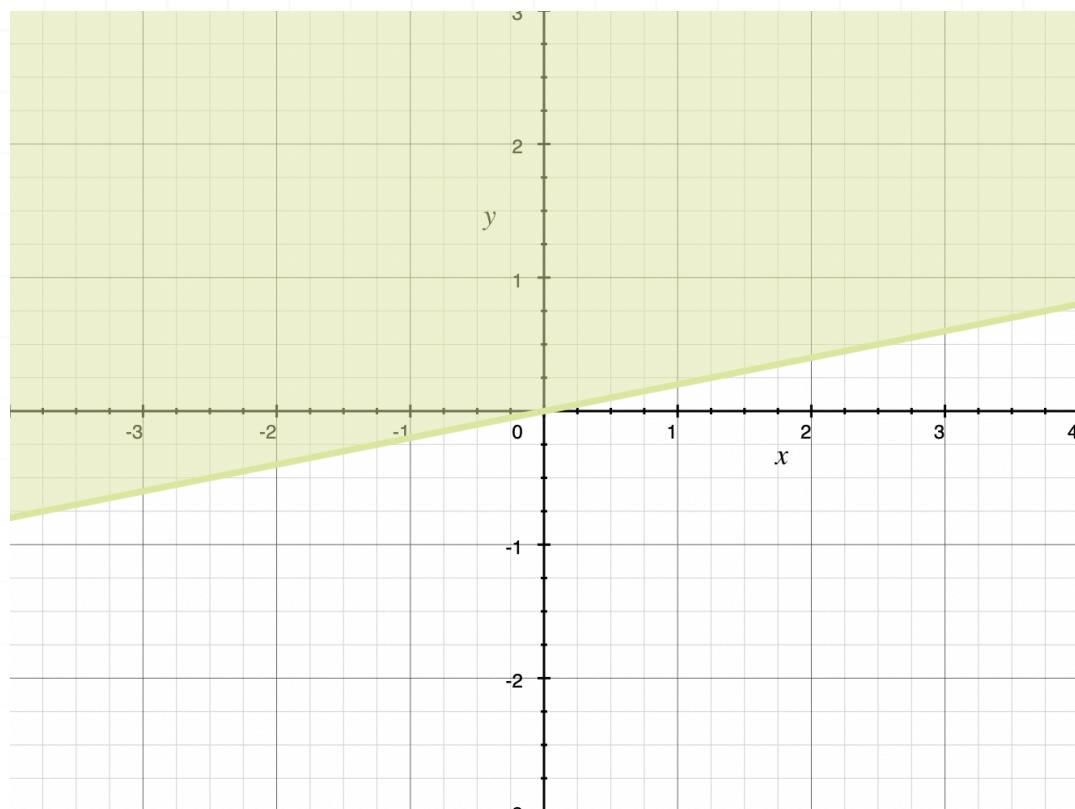
Rewrite the second inequality.

$$x \leq 5y$$

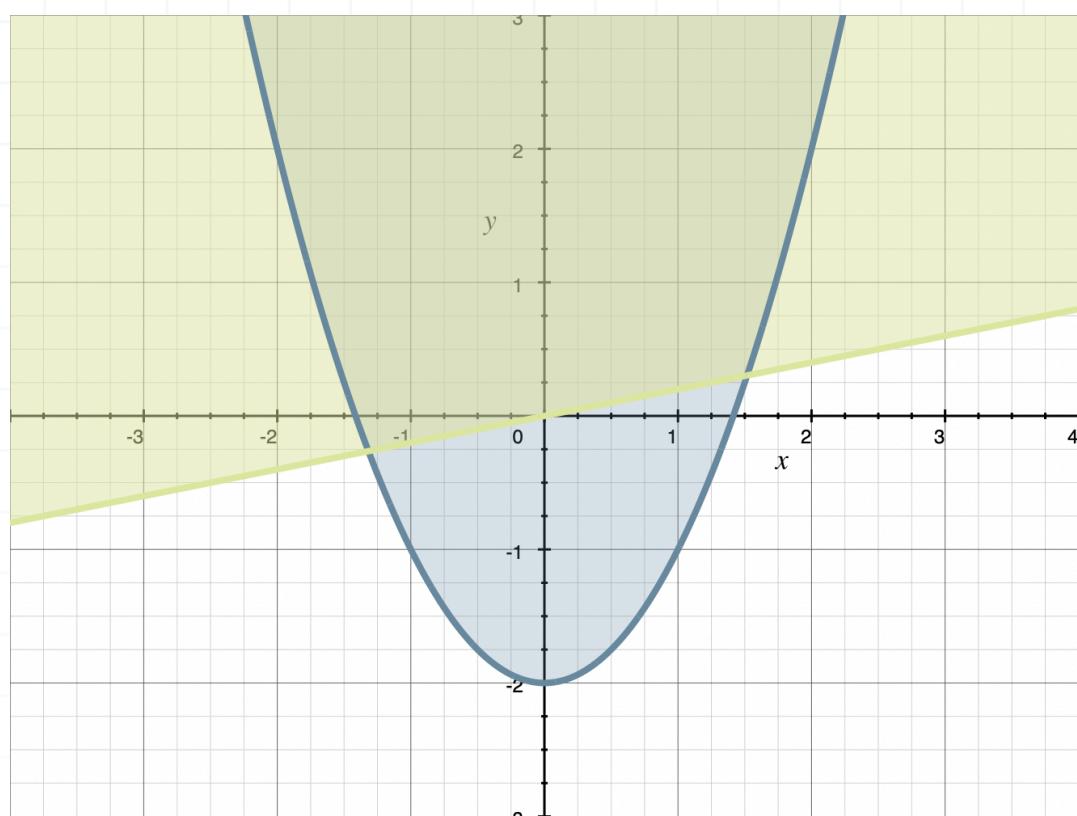
$$y \geq \frac{x}{5}$$

The graph of this inequality has a solid boundary line at  $y = x/5$ , which has a slope of  $1/5$  and a  $y$ -intercept at  $(0,0)$ .

Substitute  $(1,0)$  into the inequality to get  $0 \geq 1$  and therefore shade away from  $(1,0)$ .



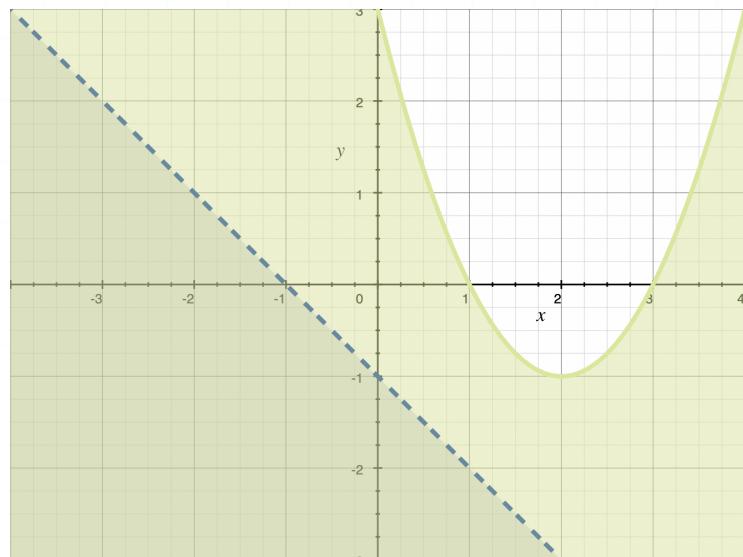
Overlaying these two regions on top of one another, we see the solution to the system of inequalities.



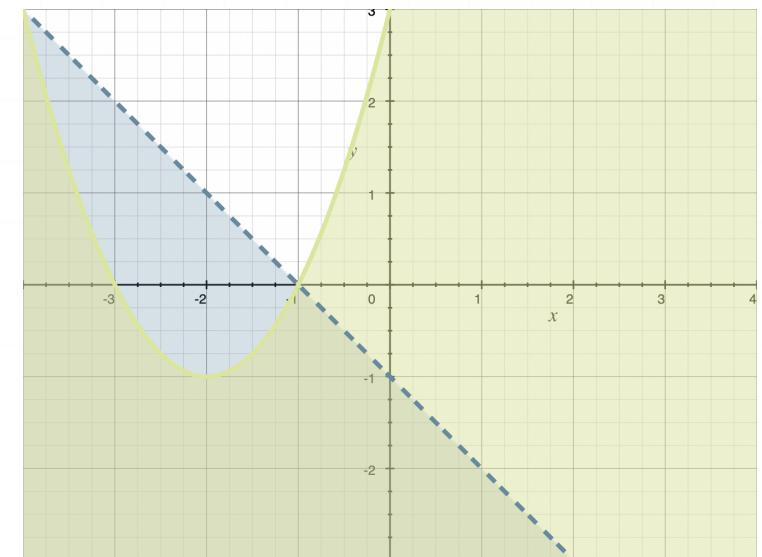
**Topic:** Systems with quadratic inequalities**Question:** Sketch the solution to the system of inequalities.

$$x + y < -1$$

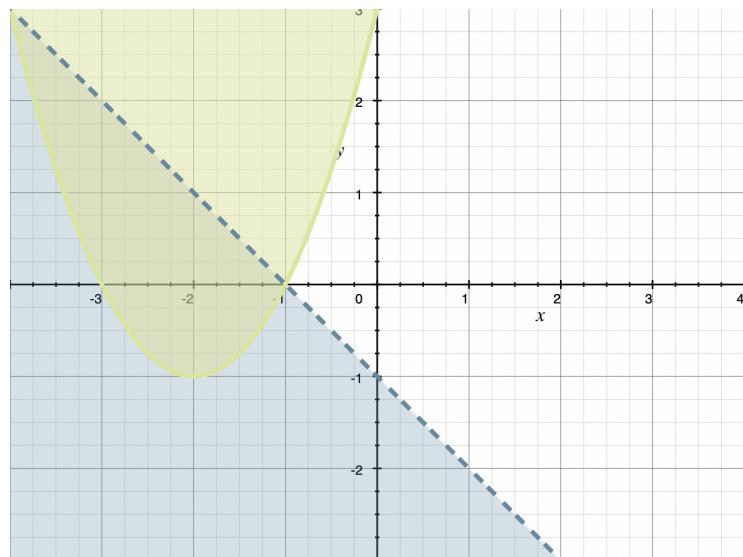
$$y \leq x^2 + 4x + 3$$

**Answer choices:**

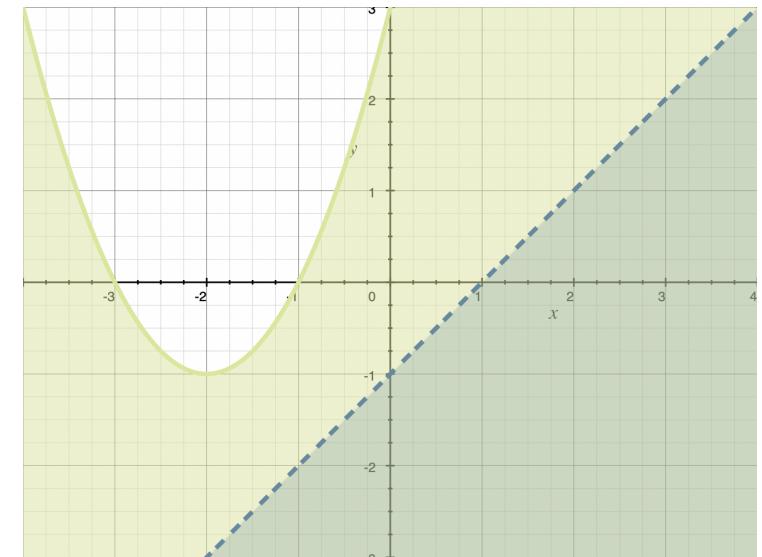
A



B



C



D

**Solution: B**

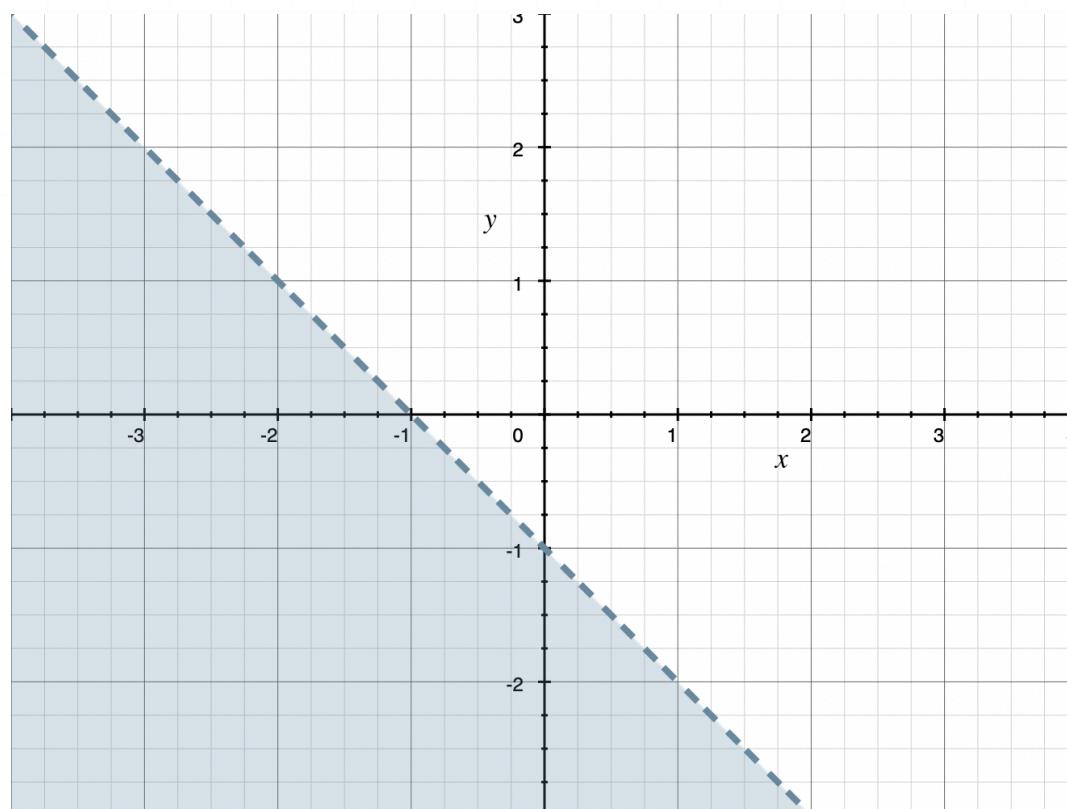
Let's rewrite the first inequality.

$$x + y < -1$$

$$y < -x - 1$$

The graph of this inequality has a dashed boundary curve, which is the line  $y = -x - 1$ . The line has a slope of  $-1$  and a  $y$ -intercept of  $-1$ .

Substitute  $(0,0)$  into the inequality to get  $0 < -1$  and therefore shade away from the origin.

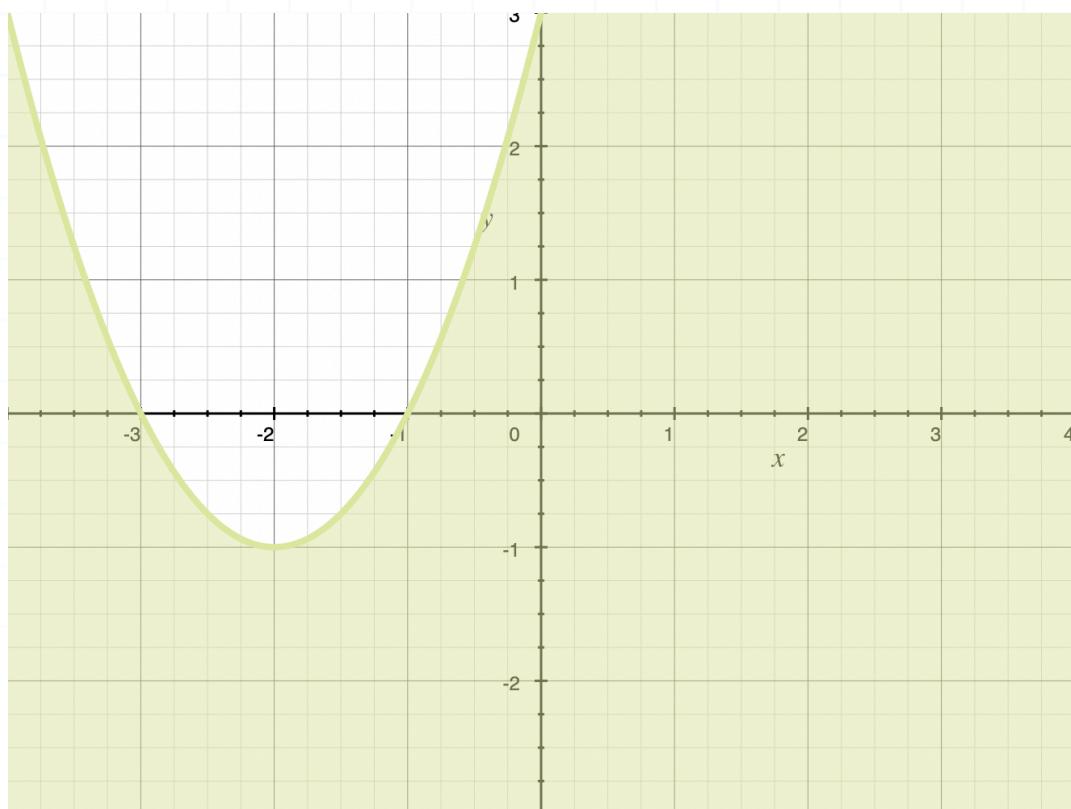


Consider the second inequality.

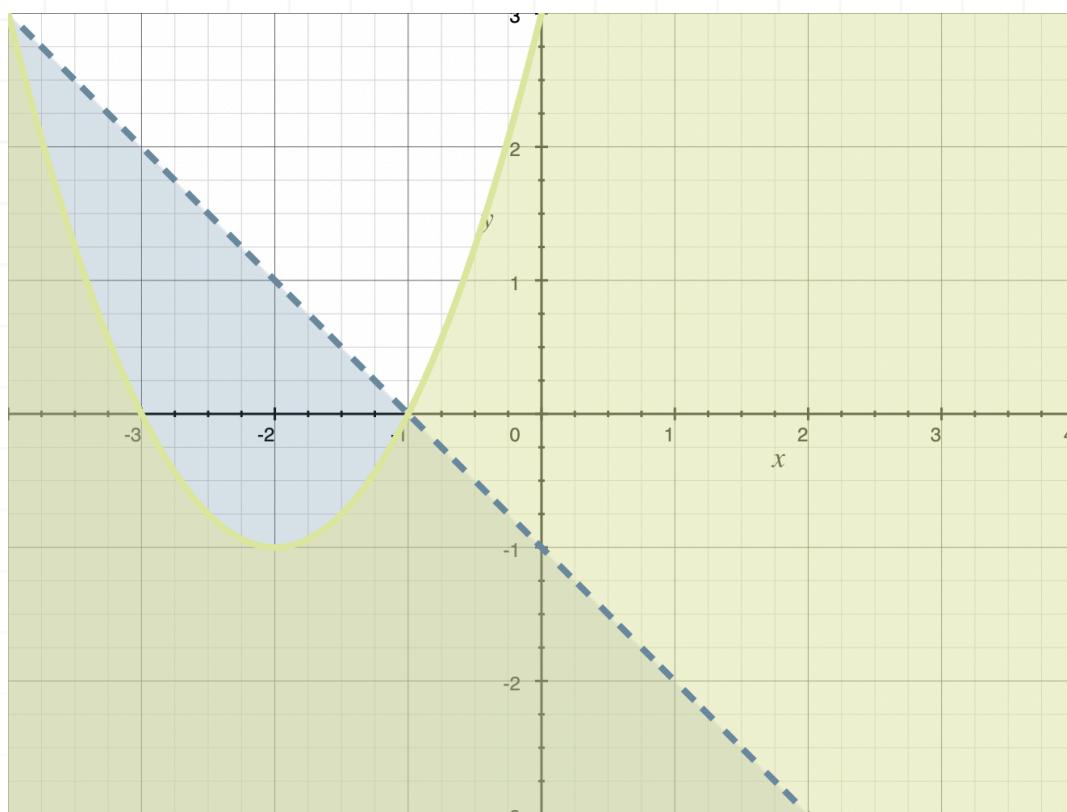
$$y \leq x^2 + 4x + 3$$

The graph of this inequality has a solid boundary line, which is the parabola  $y = x^2 + 4x + 3$ . The vertex is  $(-2, -1)$  and the parabola opens up. The  $x$ -intercepts are  $x = -1$  and  $x = -3$ .

Substitute  $(0,0)$  into the inequality to get  $0 \leq 3$  and therefore shade toward  $(0,0)$ .



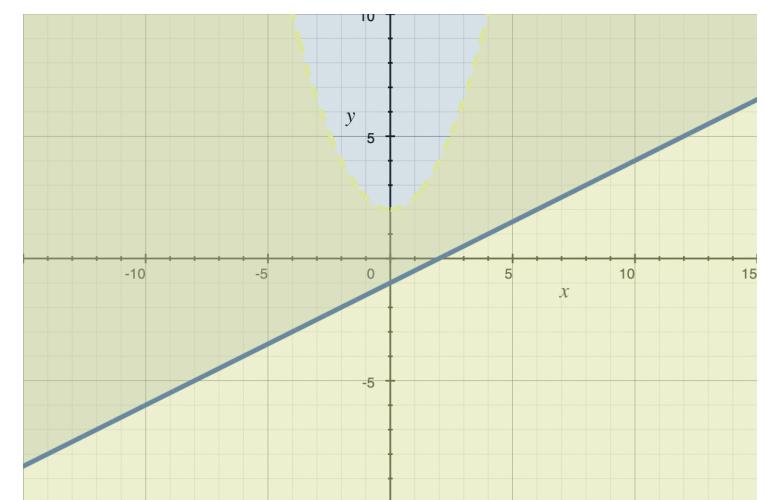
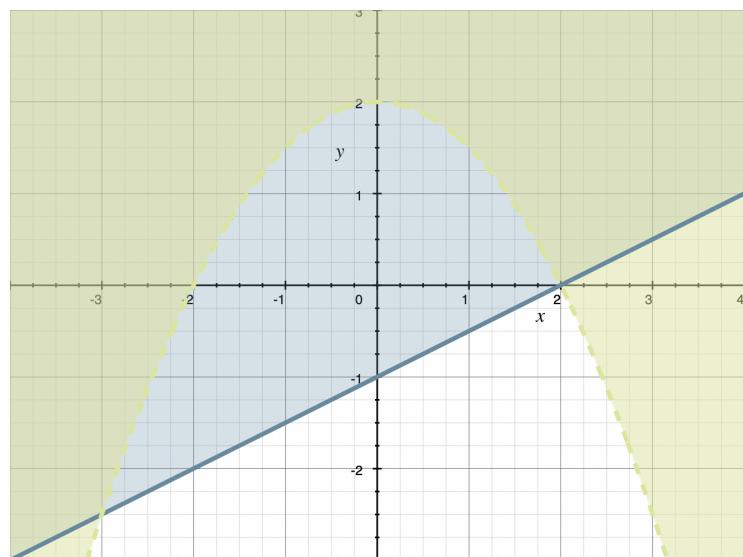
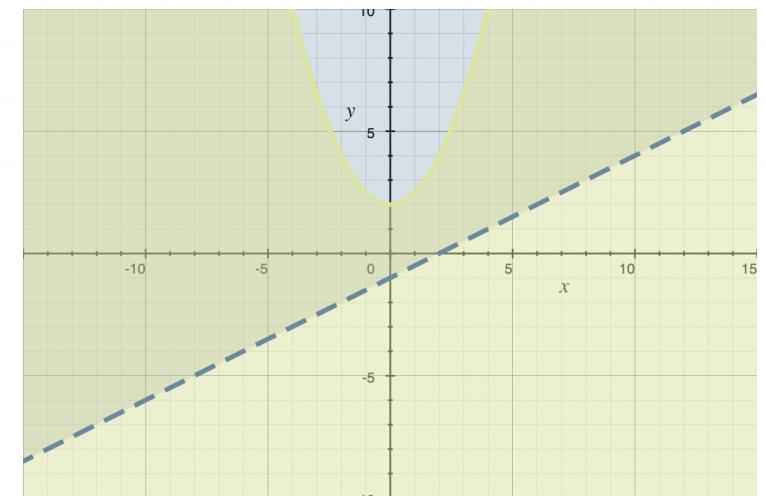
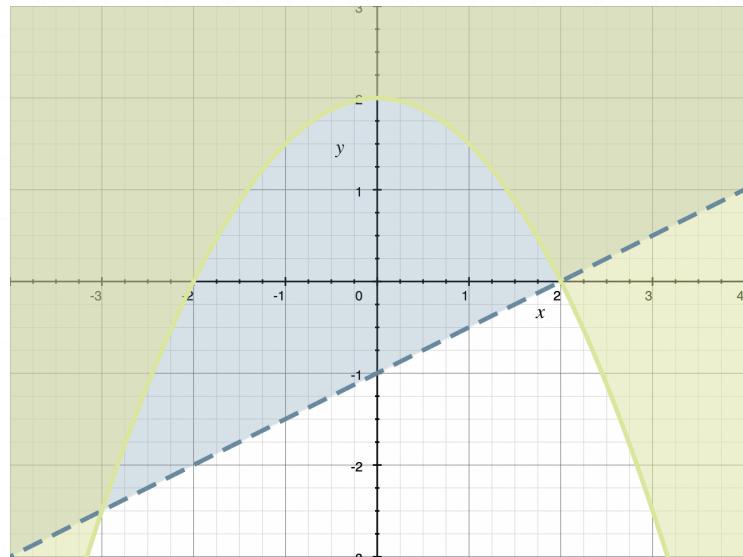
Overlaying these two regions on top of one another, we see the solution to the system of inequalities.



**Topic:** Systems with quadratic inequalities**Question:** Sketch the solution to the system of inequalities.

$$x - 2y - 2 \leq 0$$

$$x^2 + 2y > 4$$

**Answer choices:**

**Solution: C**

Let's rewrite the first inequality.

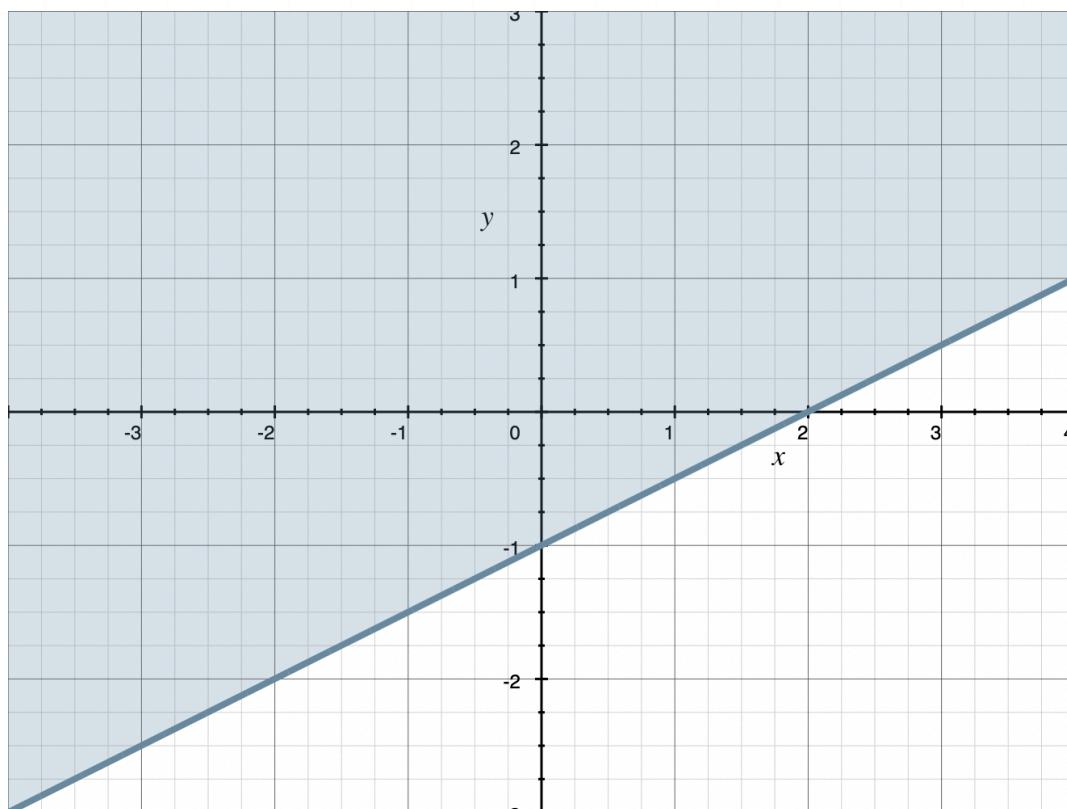
$$x - 2y - 2 \leq 0$$

$$2y \geq x - 2$$

$$y \geq \frac{1}{2}x - 1$$

The graph of this inequality has a solid boundary curve, which is the line  $y = (1/2)x - 1$ . The line has a slope of  $1/2$  and a  $y$ -intercept of  $-1$ .

Substitute  $(0,0)$  into the inequality to get  $0 \geq -1$  and therefore shade toward the origin.



Rewrite the second inequality.

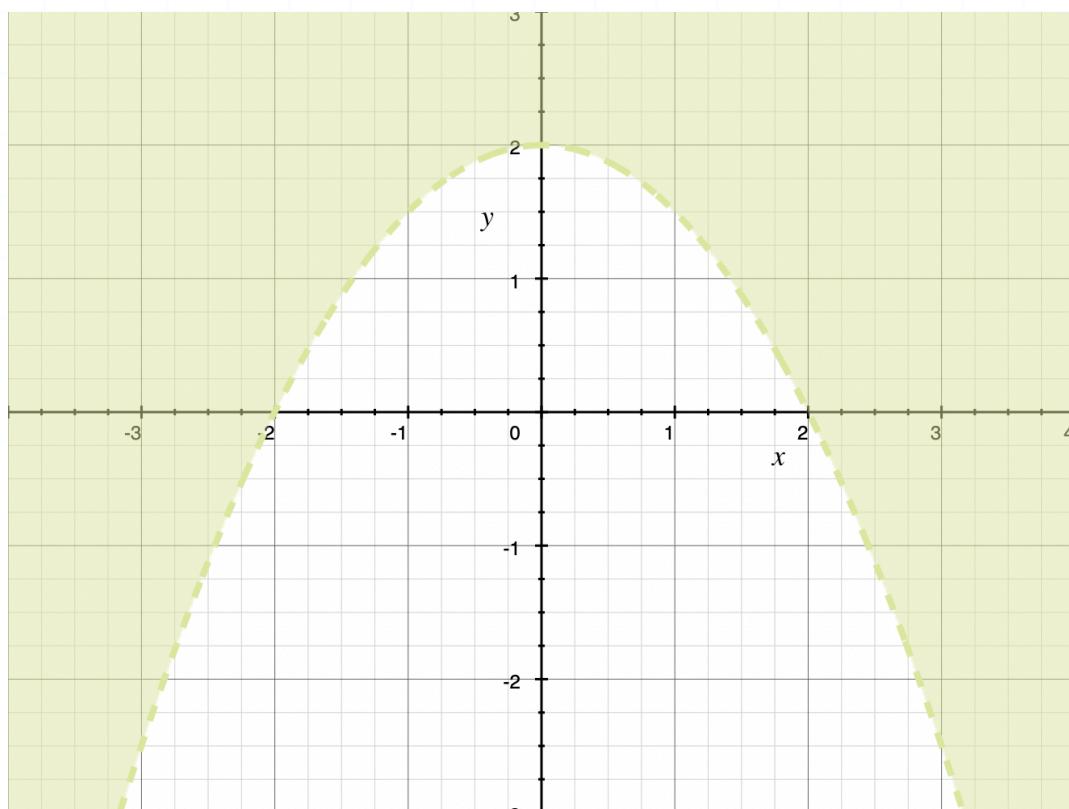
$$x^2 + 2y > 4$$

$$2y > 4 - x^2$$

$$y > -\frac{1}{2}x^2 + 2$$

The graph of this inequality has a dashed boundary line, which is the parabola  $y = -(1/2)x^2 + 2$ . The vertex is  $(0,2)$  and the parabola opens down. The  $x$ -intercepts are  $x = -2$  and  $x = 2$ .

Substitute  $(0,0)$  into the inequality to get  $0 > 2$  and therefore shade away from  $(0,0)$ .



Overlaying these two regions on top of one another, we see the solution to the system of inequalities.

