C11 - 9.3 - Quadratic Inequalities in Two Variables Notes

Graph the following inequalities

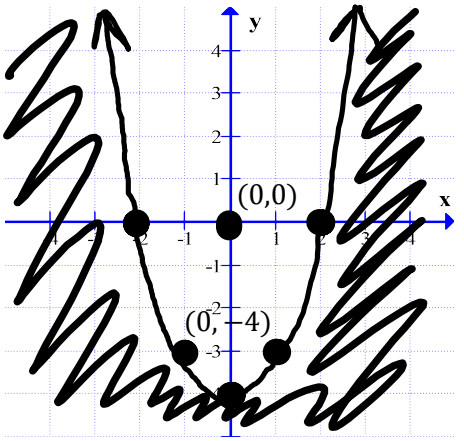
$y \le x^2 - 4$

Graph: $y = x^2 - 4$

TOV

x	y
-2	0
-1	-3
0	-4
1	-3
2	0

(Closed dots, Solid Line) $y = x^2 - 4$



Test Point $(0,0)$

$y \le x^2 - 4$
$0 \le (0)^2 - 4$
$0 \le -4$ ✗

Substitute for x and y.

Incorrect: Shade the "NOT" (0,0) side of the line.

Find Equation

$y = a(x-p)^2 + q$
$y = a(x-0)^2 - 4$
$-3 = a(1-0)^2 - 4$
$-3 = 1a - 4$
$1 = a$
$y = 1(x-0)^2 - 4$
$y = x^2 - 4$

Vertex Form

(x, y)
$(0, -4)$ Vertex

(x, y)
$(1, -3)$ Point

Test Point

y	$x^2 - 4$
0	$0^2 - 4$
$0 \le -4$	✗

$y \le x^2 - 4$

"Space" (x, y) $(0,0)$

Make a Incorrect Statement

$y > x^2 - 2x - 3$

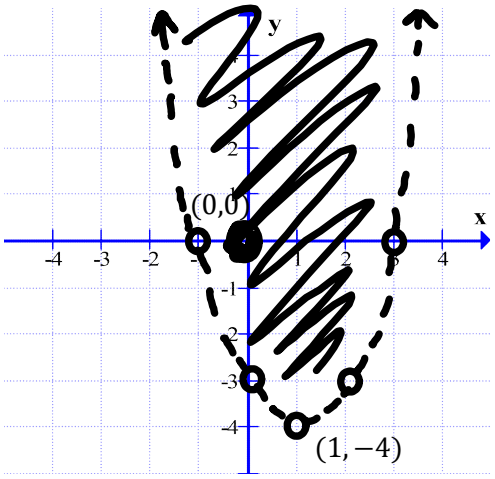
(Open dots, Dotted line) $y = x^2 - 2x - 3$

Graph: $y = x^2 - 2x - 3$

$y = x^2 - 2x - 3$ Complete the square $\left(\frac{b}{2}\right)^2$
$y = (x^2 - 2x) - 3$
$y = (x^2 - 2x + 1 - 1) - 3$
$y = (x-1)^2 - 4$ $(1, -4)$ Vertex

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

$x = -1 \quad x = 3$ $x - intercepts$



Test Point $(0,0)$

$y > x^2 - 4$
$0 > 0 - 4$
$0 > -4$ ✓

Substitute for x and y.

Correct: Shade the $(0,0)$ side of the line.

Find Equation

$y = a(x-p)^2 + q$

$y = a(x-1)^2 - 4$
$-3 = a(2-1)^2 - 4$
$-3 = 1a - 4$
$1 = a$
$y = 1(x-1)^2 - 4$

$y = (x-1)^2 - 4$

Vertex Form

(x, y)
$(1, -4)$ Vertex

(x, y)
$(2, -3)$ Point

Test Point

y	$(x-1)^2 - 4$
0	$(0-1)^2 - 4$
$0 \le -3$	✓

$y \le (x-1)^2 - 4$

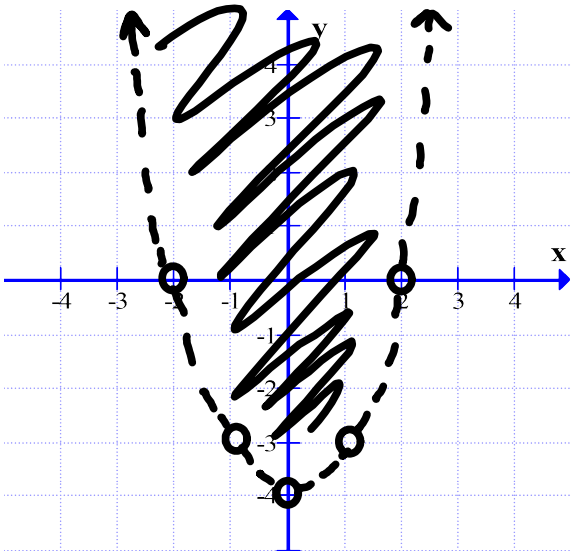
"Space" (x, y) $(0,0)$

Make a Correct Statement

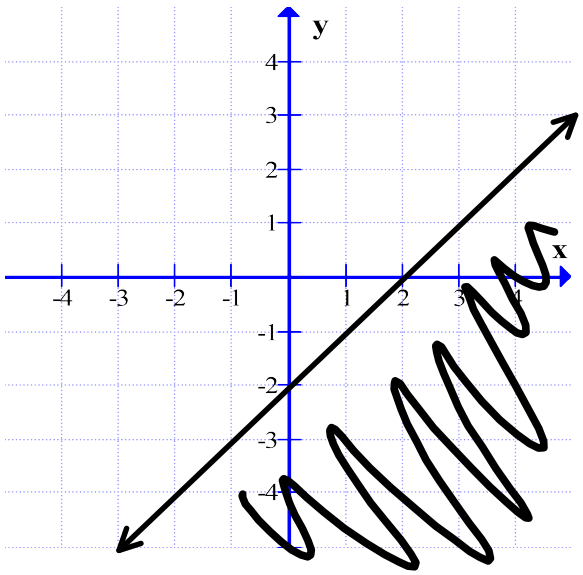
C11 - 9.3 - Inequalities Systems Notes

Solve the following system by graphing:

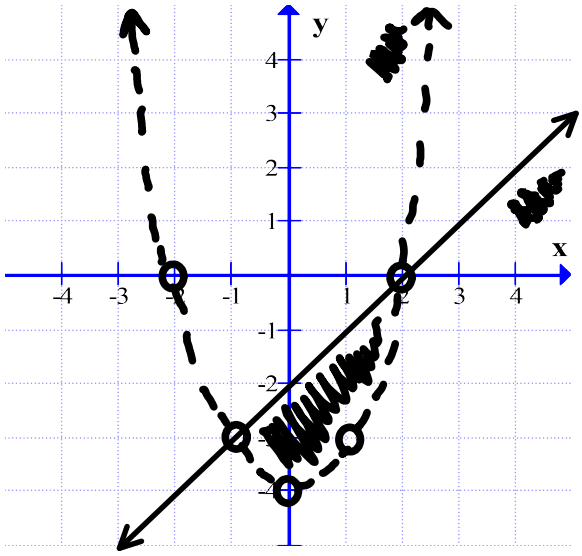
$y > x^2 - 4$



$y \leq x - 2$



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



Notice: we have graphed each equation and shaded only the region which satisfies both inequalities.