04 Quadratic Inequalities - 2 Variable

Wednesday, November 28, 2018 8:11 AM

04 Quadrati...

Why not add a y?

Most of the real and theoretical scenarios that you will come across will be in an equation. Ie: $y = ax^2 + bc + c$. The graph will show a region on the cartesian plane with the parabola being the border of solution points.

Remember:
The parabola that $y = ax^2 + bx + c$ is the boundary that divides the Cartesian plane into two regions.

- When the inequality sign is $\le$ or $\ge$, the points on the boundary are part of the Solution and the line is Solid.
- When the inequality sign is $<$ or $>$, the points on the boundary are not part of the Solution and the line is dotted / dashed.

$>, \ge$

Solve Graphically:

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

$(1, -4)$

test $(0,0)$

$0 \le (0-1)^2 - 4$

$0 \le -3$ X

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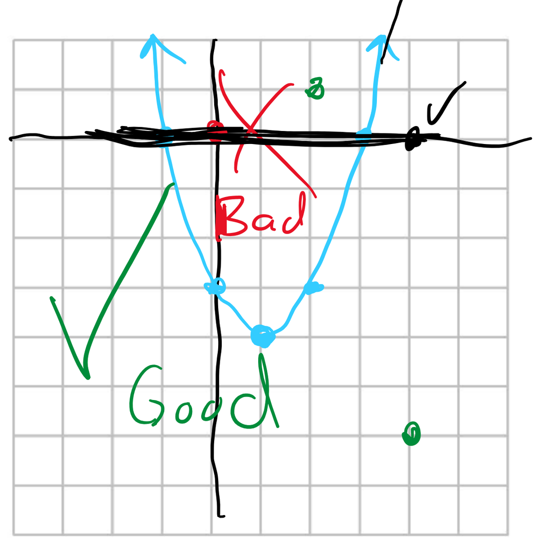


Steps to graph a quadratic inequality in 2 variables:

- Complete the square
- Find your center
  - $y = a(x-p)^2 + q$ Left by p, and up by q.
- Find your next 4 points: Stretched or shrunk by a.
- Use a test point or see which side of the line y is to find which region is the solution set.

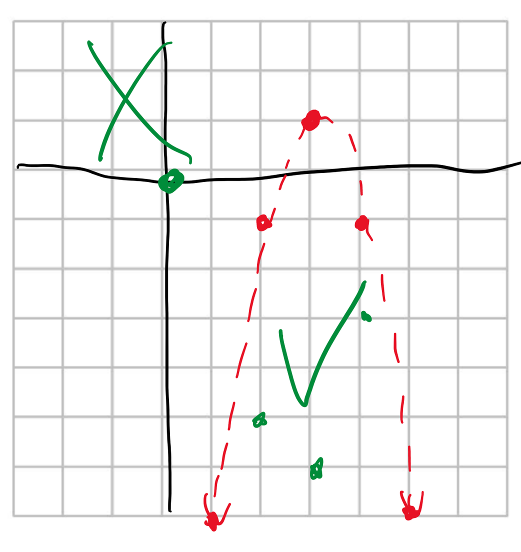
$y < -2(x-3)^2 + 1$

$(3, 1)$

$0 < -2(0-3)^2 + 1$

$0 < -18 + 1$

False



$y \ge x^2 - 4x - 5$

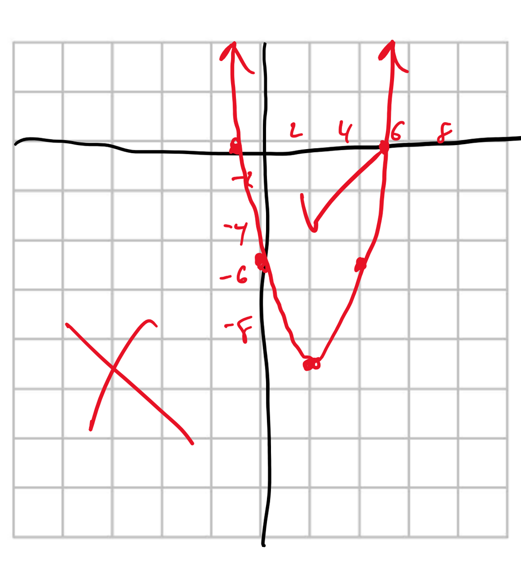
Vertex $(2, -9)$

test $(0, 0)$

$0 \ge -5$

TRUE.

$\boxed{(x-2)^2 - 4 - 5}$



Reverse Engineer the equation:

vertex $(2, 4)$

Point $(0, 0)$

$y = a(x-2)^2 + 4$

$0 = a(0-2)^2 + 4$

$0 = 4a + 4$

$\frac{-4}{4} = a$

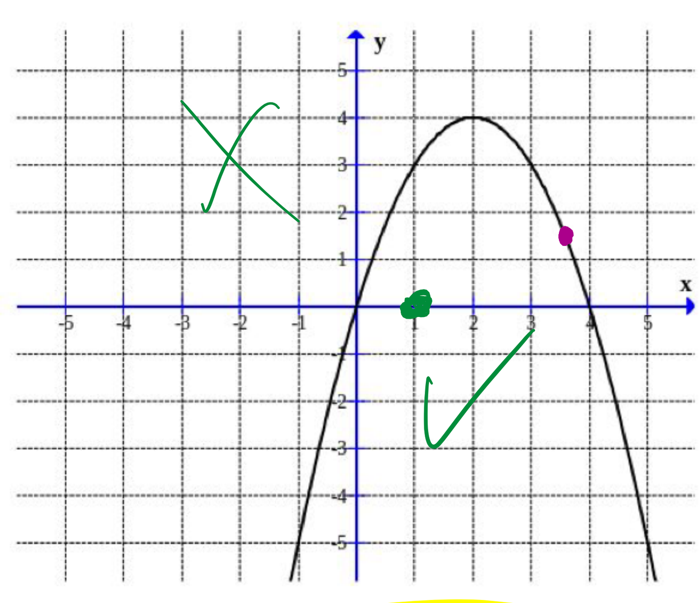
$-1 = a$

$y \square -(x-2)^2 + 4$

test $(1, 0)$

$0 \square -(1-2)^2 + 4$

$0 \le 3$



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

.5/3

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

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

point $(0, -2)$

$-2 = a(0+1)^2 - 4$

$-2 = a - 4$

$-2 + 4 = a$

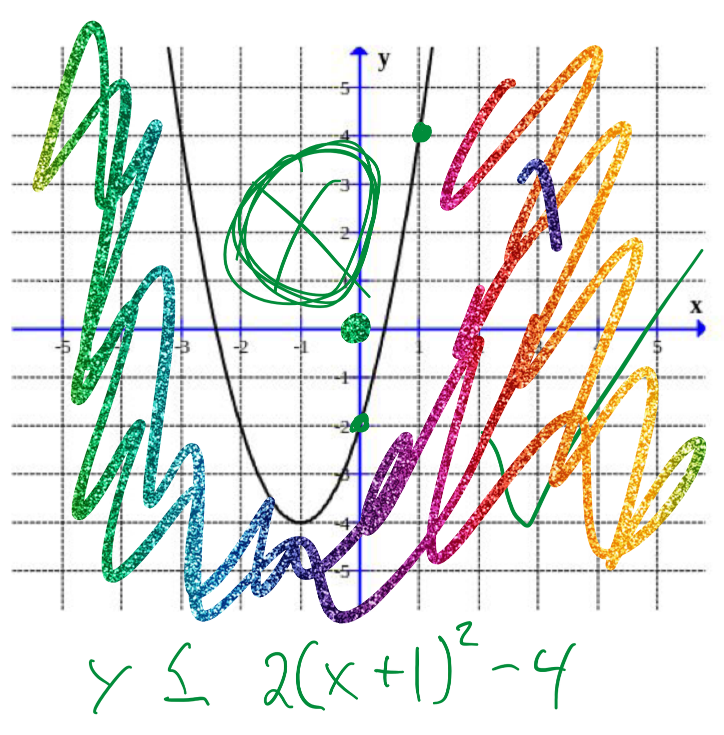
$2 = a$

$y \square 2(x+1)^2 - 4$

$0 \square 2(0+1)^2 - 4$

$0 \square 2 - 4$

$0 \le -2$ X



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

HW 9.3

3, 6, 8 - 11

3, 6, 8 - 11