9.3 Quadratic Inequalities in Two Variables

Example 1

Graph $y \geq (x - 4)^2 - 2$

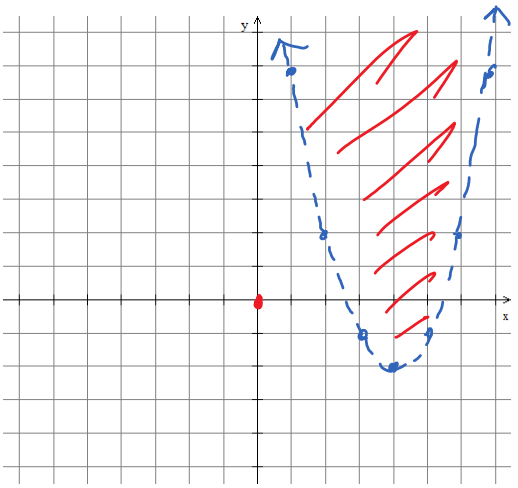
$y = (x-4)^2 - 2$

$V(4, -2)$

$0 > (0-4)^2 - 2$

$0 > 16 - 2$

$0 > 14$



Example 2

Graph $y \leq -2x^2 + 4x + 1$

$y \leq -2(x^2 - 2x + 1) + 1 + 2$

-2

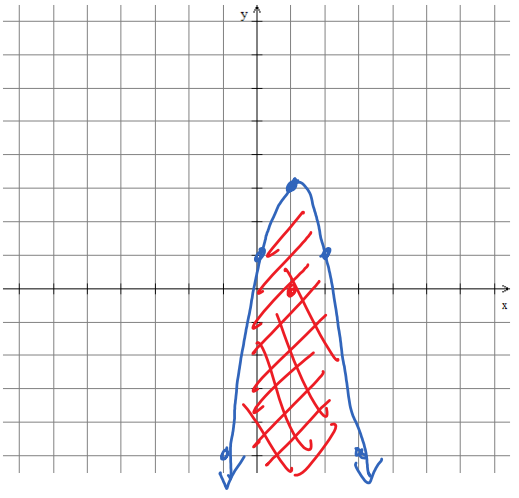
$y \leq -2(x-1)^2 + 3$

x^2
x^8
x^{18}
16

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

$0 \leq -2 + 4 + 1$

$0 \leq 3$



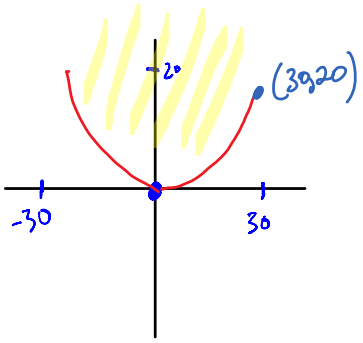
How is the solution of a quadratic inequality in two variables different from a quadratic inequality in one variable

The solution of a quadratic inequality in 2 variables is a set of ordered pairs that can be represented as a region on a coordinate plane. The solution of a quadratic inequality in 1 variable is a set of numbers that can be represented on a number line.

Example 3

A satellite dish is 60 cm in diameter and 20 cm deep. The dish has a parabolic cross section. Locating the vertex at the origin

a) determine the equation which represents the shape of the dish



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

$y = ax^2$

$20 = a(30)^2$

$20 = 900a$

$\frac{2}{90} = a$

$y = \frac{2}{90}x^2$

b) From what region can the dish receive a signal?

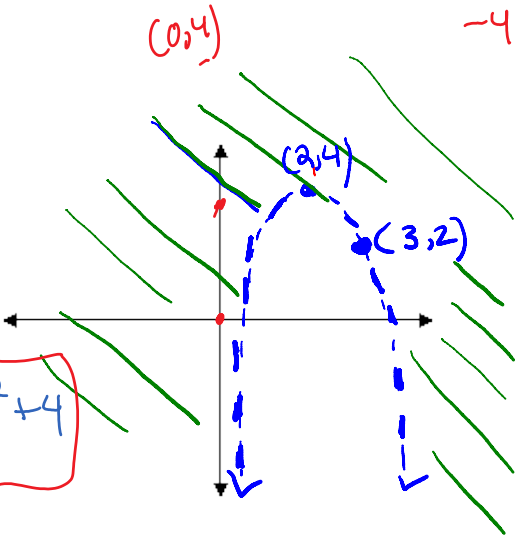
$y \geq \frac{2}{90}x^2$

$4 \boxed{>} -2(-2)^2+4$

-4

Example 4

Write an inequality for the following graph



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

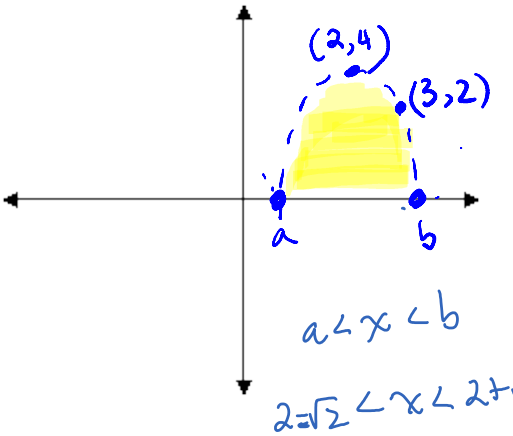
$2 = a(3-2)^2+4$

$2 = a+4$

$-2 = a$

$\boxed{y > -2(x-2)^2+4}$

Write an inequality for the following graph



$y < -2(x-2)^2+4$

Write the domain?

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

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

$2 = (x-2)^2$

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

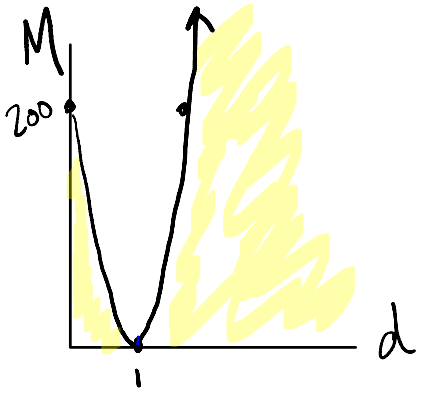
$2 \pm \sqrt{2} = x$

$a < x < b$

$2-\sqrt{2} < x < 2+\sqrt{2}$

Example 5

A rope, of diameter 'd' cm, can hold up to 'M' pounds, modelled by the inequality $M \leq 200(d - 1)^2$. Graph the inequality



Assignment p496 #1ac,3, 4ac,5ac,6ac,8,9,11a,13a

* Review Quiz next class *