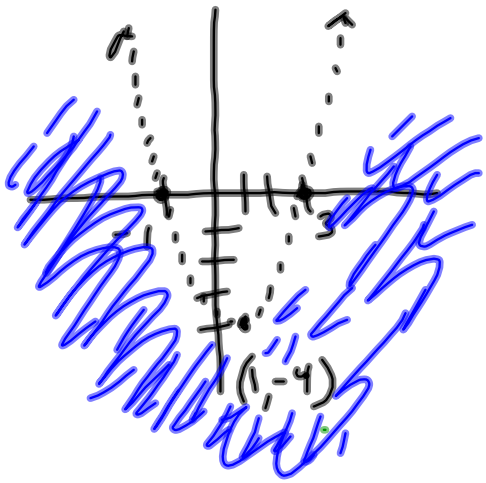
9.3 Quadratic Inequalities in Two Variables

In 9.2 we had $ax^2+bx+c \leq 0$
(find solution for x)

Now we have $ax^2+bx+c \leq y$
(find the solution region)

example pg. 490

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



$x^2-2x-3=0$
$(x-3)(x+1)=0$
$\boxed{x=3 \quad x=-1}$

$-\frac{b}{2a}=\frac{2}{2}=1$

$(1)^2-2(1)-3$
$=-4$

ex. 1 pg. 490

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

b) Determine if the point $(2,-4)$ is a solution to the inequality.

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

vertex $(3,1)$

opens down

intercepts

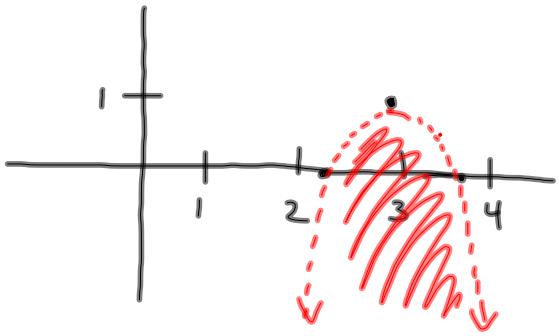
$0 = -2(x-3)^2 + 1$

$0 = -2(x^2 - 6x + 9) + 1$

$0 = -2x^2 + 12x - 17$

$$x = \frac{-12 \pm \sqrt{(12)^2 - 4(-2)(-17)}}{2(-2)}$$

$$= \frac{-12 \pm \sqrt{8}}{-4} \quad \frac{-12+\sqrt{8}}{-4} \approx 2.3 \quad \frac{-12-\sqrt{8}}{-4} \approx 3.7$$



b) $(2,-4)$

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

$-4 < -2(2-3)^2 + 1$

$-4 < -2(-1)^2 + 1$

$-4 < -1$ ✓

Final Practice Work

Sec. 9.2 pg. 484

1, 3a,b, 4a, 7a,b

Sec. 9.3 pg. 496

3, 6