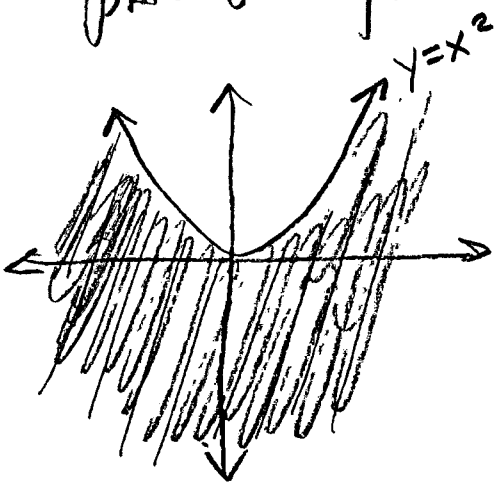
Algebra 2 | Monday 4-29-13 | Class Notes

# Ch. 2-7 Solving Quadratic Inequalities

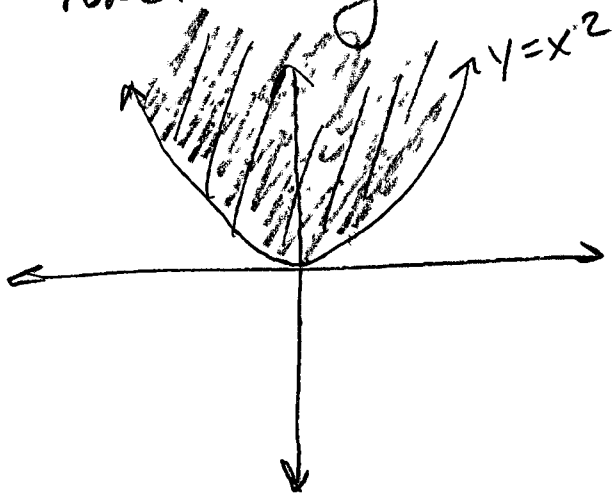
Quadratic inequality: $y \leq ax^2+bx+c$ (or $<$) / $y \geq ax^2+bx+c$ (or $>$)

- $\leq$ or $<$: solid line
- $\geq$ or $>$: dashed line
- parabola

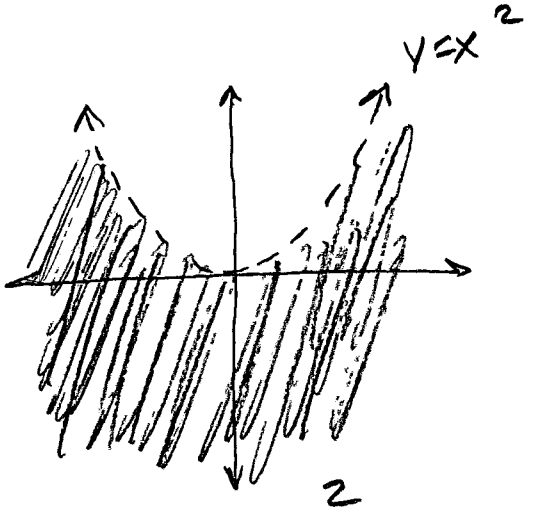
Parent "parabola" function $y = x^2$

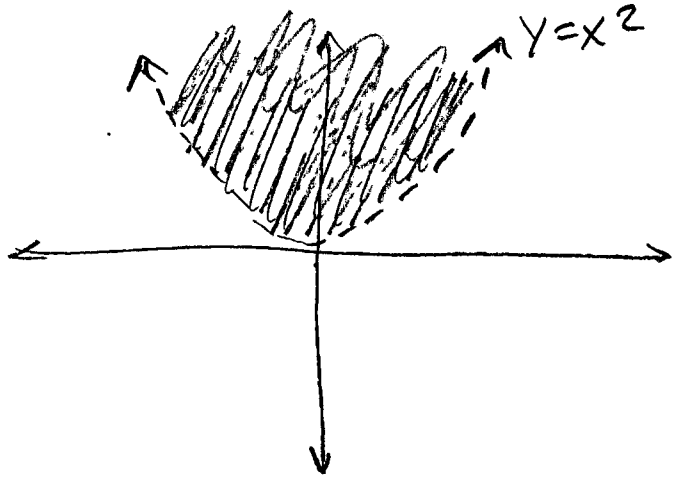



$y \leq x^2$



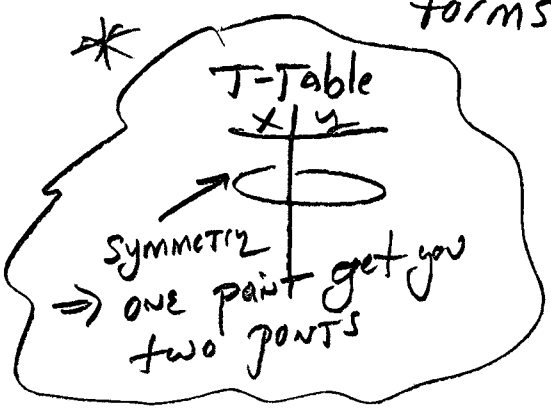

$y \geq x^2$




## Steps to graph a quadratic inequality

1. Put in $y=ax^2+bx+c$ form and graph the parabola that forms the boundary.




AOS $\Rightarrow x = \frac{-b}{2a}$

y-intercept $\Rightarrow (0, c)$

x-intercepts $\Rightarrow$ solution to Quadratic Equation, let $y=0$

2. Shade "true" region of graph,
   - Above the parabola $y >$ or $y \geq$
   - Below the parabola $y <$ or $y \leq$

NOTE: if there is NO "y", all you have is a quadratic equation and the "solution" will be either all the points on the x axis between the 2 solutions (an "and" inequality) or the points to infinity on either side (an "or")

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(Ex) $x^2 - 6x + 8 \leq 3$

$-3 \quad -3$

$x^2 - 6x + 5 \leq 0$

use GRI!

"Golden Rule of Inequalities"

sum $= -6$

prod $= 5$

$-1 \quad -5$

$(x-1)(x-5) \leq 0$

$x - 1 \leq 0$ | $x - 5 \leq 0$

$x \leq 1$ | $x \leq 5$ ← points on x axis

check 3 regions


FALSE TRUE FALSE

↑ ↑ ↑

use $x=0$ $x=3$ $x=6$

$\therefore$ $1 \leq x \leq 5$

"AND"

Look closer at $x^2-6x+8 \leq 3$

$x^2-6x+5 \leq 0$

Change to a quadratic function

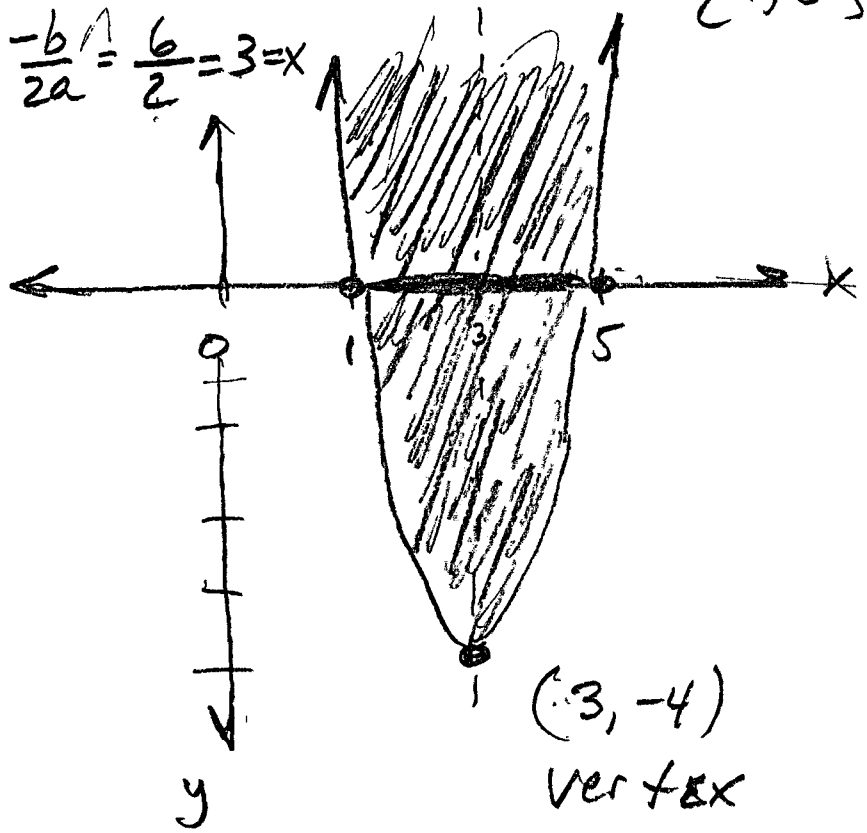
$x^2-6x+5 \leq y$

or $y \geq x^2-6x+5$ roots are $\{1,5\}$

AOS $\Rightarrow \frac{-b}{2a} = \frac{6}{2} = 3 = x$

| x | y |
|---|---|
| 3 | -4 |

Vertex




The "true" region is inside the parabola

(Ex3) Pg 112

$$x^2 - 4x + 1 > 6$$

$$x^2 - 4x - 5 > 0$$

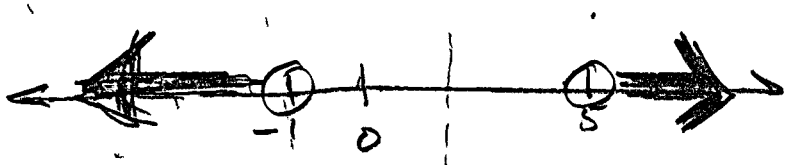
sum $\Rightarrow -4$

prod $\Rightarrow -5$

$+1 \quad -5$

$$(x+1)(x-5) > 0$$

$x = 5, -1$




| test | test | test |
|---|---|---|
| $x = -2$ | $x = 0$ | $x = 10$ |
| true | false | true |

$x < -1$ OR $x > 5$

Homework: Pg 114 2 to 4, 8 to 10.