Quadratic Inequality in 1 variable

solve *graphically*:
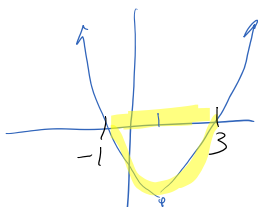
$x^2 - 2x - 3 < 0$

convert to vertex form:

Quadratic Inequality in 2 Variables

$y \le x^2 - 2x - 3$

$\dfrac{b}{2} = \dfrac{-2}{2} = \boxed{-1}$ $(-1)^2 = \boxed{1}$

$\boxed{x^2 - 2x} \; +1 - 1 \; -3$

$(x-1)^2 - 4$

$\boxed{y = a(x - p)^2 + q}$

Vertex: $(1, -4)$

$x^2 + 2x - 3 < 0$

where are y-values negative?

Test $(0,0)$

solid because $\le$

$\{x \mid -1 < x < 3, \; x \in \mathbb{R}\}$

$y \le x^2 - 2x - 3$

Test $(0,0)$:

$0 \le 0 - 0 - 3$

$0 \le -3$ FALSE
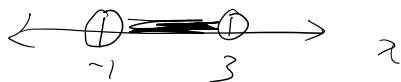
So shade other region

Solve algebraically:

$x^2 - 2x - 3 \overset{\text{prefered}}{=} 0$

$\begin{array}{l} -3 \quad x \quad 1 = -3 \\ -3 \quad + \quad 1 = -2 \end{array}$

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

$x - 3 = 0$ or $x + 1 = 0$

$x = 3$ or $x = -1$

OR use quad. formula!
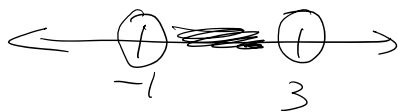
Test: -2
$x^2 - 2x - 3 < 0$
$(-2)^2 - 2(-2) - 3 < 0$
$4 + 4 - 3 < 0$
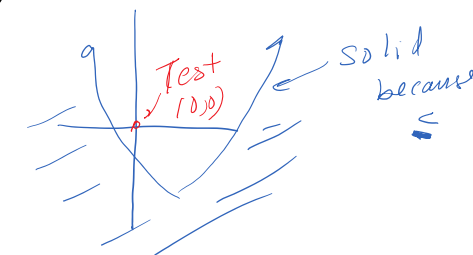
Test: 0
$x^2 - 2x - 3 < 0$
$0 - 0 - 3 < 0$
$-3 < 0$

Test: 4
$y^2 - 2(4) - 3 < 0$
$16 - 8 - 3 < 0$

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

$4 + 4 - 3 < 0$

$5 < 0$

FALSE

$0 - 0 - 3 < 0$

$-3 < 0$

TRUE

so Shade!

$4^2 - 2(4) - 3 < 0$

$16 - 8 - 3 < 0$

$5 < 0$

FALSE