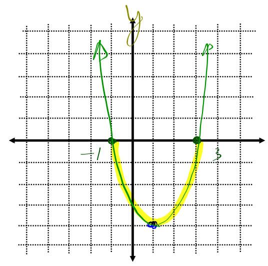
9.2 Quadratic Inequalities in one variable

ex. solve $x^2 - 2x - 3 \le 0$ y



Option 1: Use the graph to draw a conclusion

graph $y = x^2 - 2x - 3$

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

$x = 3 \quad x = -1$

AOS: $x = 1$

vertex: $y = (1)^2 - 2(1) - 3$

$y = -4$

Sol^n: $-1 \le x \le 3$

nodes filled in

Option 2: Use the roots of the equation and test points.

from above the roots are $x = -1$ and 3

test points in each interval

$\boxed{x=-2}$: $x^2 - 2x - 3 \le 0$

$(-2)^2 - 2(-2) - 3 \le 0$

$4 + 4 - 3 \le 0$

$5 \le 0$

not part of the sol^n

test $\boxed{x=0}$: $(0)^2 - 2(0) - 3 \le 0$

$\boxed{-3 \le 0}$ true

part of sol^n

test $\boxed{\cancel{x=5}}$: $(5)^2 - 2(5) - 3 \le 0$

$\boxed{12 \le 0}$ false

Sol^n

$-1 \le x \le 3$

or

$x = [-1, 3]$

square bracket means inclusive

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$x^2 - 10x + 16 \le 0$

$(x-8)(x-2) \le 0$

$\boxed{x=8} \quad \boxed{x=2}$

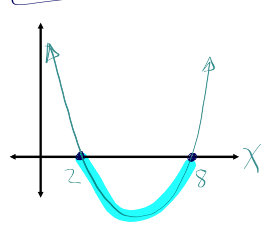
$\boxed{\text{or}}$

factor: $x = 2$ and 8

test $\boxed{x=0}$: $(0)^2 - 10(0) + 16 \le 0$

$\boxed{16 \le 0}$ false

So not part of sol^n

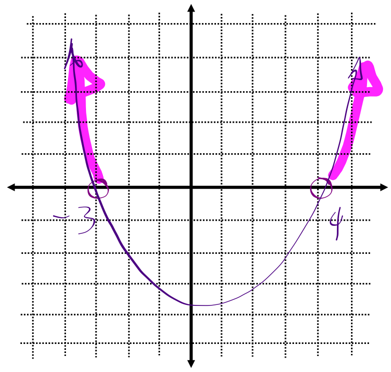


conclude ... it must be

$\boxed{2 \le x \le 8}$

ex. solve $-x^2 + x < -12$

Option 1: Use the graph to draw a conclusion



$0 < x^2 - x - 12$

$0 < (x-4)(x+3)$

$\boxed{x=4}$ $\boxed{x=-3}$

Note there will always be a round bracket if ∞ is a boundary

ex// $x \geq 4$ and $x \leq -3$

$(-\infty, -3] \cup [4, \infty)$

$\therefore x > 4$ and $x < -3$

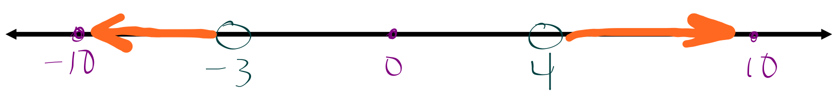
$\boxed{\cancel{4 < x < -3}}$

or $(-\infty, -3) \cup (4, \infty)$

union (plus)

round bracket for exclusive

Option 2: Use the roots of the equation and test points.



test $x = -10$: $-(-10)^2 + (-10) < -12$

$-100 - 10 < -12$

$\boxed{-110 < -12}$ true $\therefore x = -10$ is IN the sol^n

$\therefore$ Since this is quadratic with 2 roots $x = 10$ will also satisfy the inequality

$\therefore x > 4$ and $x < -3$

Quiz tomorrow

Homefun: Pg. 484 #(1-4)ac, 7, 9-13, 15ab, 16, 17