

7.3 Quadratic Inequalities (1 var)

Saturday, May 16, 2020 3:55 PM

7.3 Quadratic Inequalities in One Variable

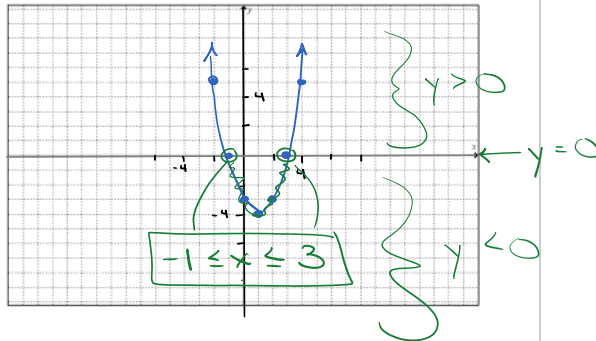
$ax^2 + bx + c < 0$ $ax^2 + bx + c \leq 0$ $ax^2 + bx + c > 0$ $ax^2 + bx + c \geq 0$
 Where $a, b,$ and c are real numbers and $a \neq 0$

Example 1: Solve $x^2 - 2x - 3 \leq 0$

$(\frac{-2}{2})^2 = (-1)^2 = 1$

a) Graphically

① Graph $y = (x^2 - 2x) - 3 \rightarrow -1$
 $y = 1(x^2 - 2x + 1) - 3$
 $y = (x - 1)^2 - 4$
 vertex $(1, -4)$ $a = 1$



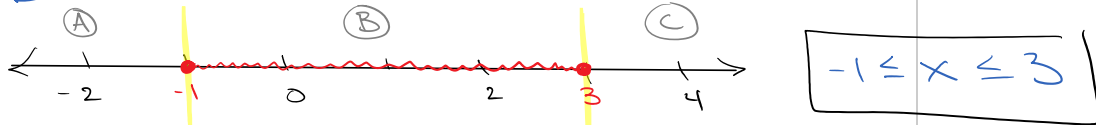
② Identify the region that satisfies the inequality.
 $x^2 - 2x - 3 \leq 0$
 $y \leq 0$

b) Algebraically (Roots and Test Points)

Solve $x^2 - 2x - 3 = 0$

① find the **critical point** (roots of corresponding equation)
 $x^2 - 2x - 3 = 0$
 $(x - 3)(x + 1) = 0 \rightarrow x = 3 \quad x = -1$

② Draw a number line using critical points as boundaries.



③ Choose TP in each region

A $x = -2$
 $(-2)^2 - 2(-2) - 3 \leq 0$
 $4 + 4 - 3 \leq 0$
 $5 \leq 0$
 False!

B $x = 0$
 $(0)^2 - 2(0) - 3 \leq 0$
 $-3 \leq 0$
 True!

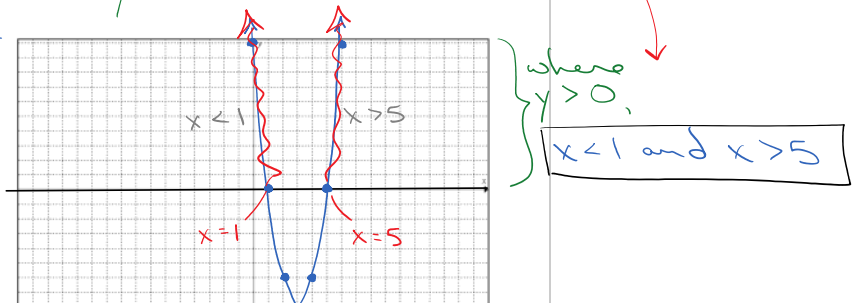
C $x = 4$
 Pre-Calc 11
 $(4)^2 - 2(4) - 3 \leq 0$
 $16 - 8 - 3 \leq 0$
 $5 \leq 0$
 False!

Example 2: Solve $2x^2 - 12x > -10$

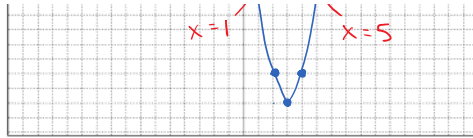
$2x^2 - 12x + 10 > 0$ (not including critical values)

a) Graphically

→ complete the square
 $y = (2x^2 - 12x) + 10$ $(\frac{-6}{2})^2 = (-3)^2 = 9$
 $y = 2(x^2 - 6x + 9 - 9) + 10$
 $y = 2(x - 3)^2 - 8$
 $a = 2$ vertex $(3, -8)$



$a=2$ vertex $(3, -8)$



b) Algebraically (Roots and Test Points)

Solve $2x^2 - 12x > -10$

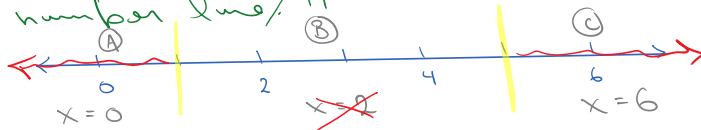
$2x^2 - 12x + 10 > 0$ ① find critical points

$2(x^2 - 6x + 5) = 0$

$2(x-5)(x-1) = 0 \rightarrow x=5 \quad x=1$

②/③

number line / TP



$x < 1$ and $x > 5$

Ⓐ $2(0)^2 - 12(0) > -10$
 $0 > -10$
 True!

Ⓑ $2(2)^2 - 12(2) > -10$
 $8 - 24 > -10$
 $-16 > -10$
 False!

Ⓒ $2(6)^2 - 12(6) > -10$
 $72 - 72 > -10$
 $0 > -10$
 True!

Practice: p. 484 # 3a, 4a, 6abc, 7ab (Need graph paper)