

To Solve a Polynomial Inequality:

- 1.) Start in standard form with zero on the right of the inequality.
- 2.) Solve the corresponding polynomial equation. (critical numbers)
- 3.) Identify the intervals determined by the solutions of the equation.
- 4.) Use a sign graph to determine which intervals make the inequality true.

Solve $x^2 - x - 6 < 0$

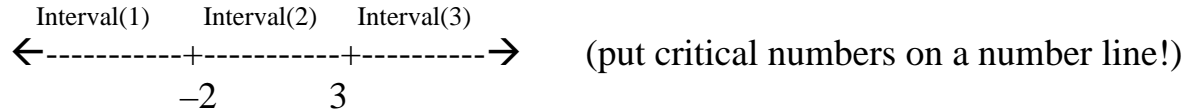
- 1.) Start in standard form with zero on the right of the inequality.

$$x^2 - x - 6 < 0$$

- 2.) Solve the corresponding polynomial equation. (to get critical numbers)

$$\begin{aligned}x^2 - x - 6 &= 0 \\(x - 3)(x + 2) &= 0 \\x - 3 = 0 & \quad x + 2 = 0 \\x = 3 & \quad x = -2 \quad \text{-2 and 3 are the critical numbers !}\end{aligned}$$

- 3.) Identify the intervals determined by the solutions of the equation.



- 4.) Use a sign graph to determine which intervals make the inequality true.

Test points

$$x = -3$$

$$(-3)^2 - (-3) - 6 = +6$$

this solution is **NO** +6 is > 0 !

Test points

$$x = 0$$

$$(0)^2 - (0) - 6 = -6$$

this solution is **YES** -6 is < 0 !

Test points

$$x = 4$$

$$(4)^2 - (4) - 6 = +6$$

this solution is **NO** +6 is > 0 !

Answer: all x values between -2 and 3. We write this in interval notation as:

$$(-2, 3)$$