

# Solving Inequalities

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## Objectives:

1. I will be able to solve linear and nonlinear inequalities with or without technology.
2. I will be able to write the solution using interval notation.



## Linear Inequalities

$$5 - 3x \leq 4x + 2$$

$$\begin{array}{r} +3x \quad +3x \\ 5 \leq 7x + 2 \\ -2 \quad -2 \\ \hline 3 \leq 7x \\ \frac{3}{7} \leq x \end{array}$$

$$\left[ \frac{3}{7}, \infty \right)$$

I will be able to solve inequalities and write the answer in interval notation.



Compound

$$\begin{array}{r} +5 \quad +5 \quad +5 \\ -3 \leq 2x - 5 \leq 10 \end{array}$$

$$\frac{2}{2} \leq \frac{2x}{2} \leq \frac{15}{2}$$

$$1 \leq x \leq \frac{15}{2}$$

$$\left[ 1, \frac{15}{2} \right]$$

$$\left[ 1, \frac{15}{2} \right]$$

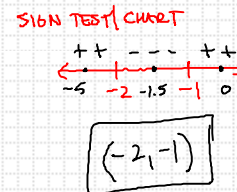
## Nonlinear Inequalities

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

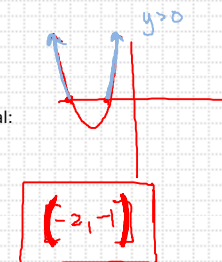
Algebraic:

$$(x+2)(x+1) < 0$$

$x = -2, -1$  (ZEROS)



Graphical:



I will be able to solve inequalities and write the answer in interval notation.



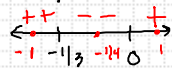
### Nonlinear Inequalities

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

Algebraic:

$$x(3x+1) < 0$$

$$x=0, -\frac{1}{3}$$



$$(-\frac{1}{3}, 0)$$

Graphical:



I will be able to solve inequalities and write the answer in interval notation.



### Nonlinear Inequalities

$$4x^2 - 4x \geq 13$$

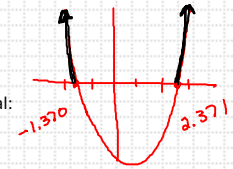
Algebraic:

$$4x^2 - 4x - 13 \geq 0$$

$$(4x - 13)(x + 1) \geq 0$$

DOESN'T FACTOR

Graphical:



$$(-\infty, -1.370] \cup [2.371, \infty)$$

I will be able to solve inequalities and write the answer in interval notation.

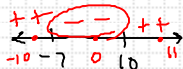


### Nonlinear Inequalities – Rational Functions

$$\frac{x+7}{x-10} < 0$$

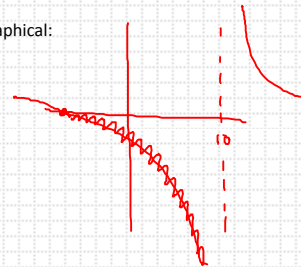
Algebraic:

$$\text{zeros: } -7, 10$$



$$(-7, 10)$$

Graphical:



I will be able to solve inequalities and write the answer in interval notation.



### Nonlinear Inequalities – Rational Functions

$$\frac{x+7}{x-10} \leq 0$$

Algebraic:

$$[-7, 10)$$

Graphical:

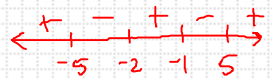
I will be able to solve inequalities and write the answer in interval notation.



### Nonlinear Inequalities – Rational Functions

$$\frac{x^2 - 25}{x^2 + 3x + 2} \geq 0$$

Algebraic:



$$(-\infty, -5] \cup (-2, -1) \cup [5, \infty)$$

$$\frac{(x+5)(x-5)}{(x+1)(x+2)} \geq 0$$

Graphical:



I will be able to solve inequalities and write the answer in interval notation.



### Nonlinear Inequalities – Rational Functions

$$\frac{-x}{2x-1} \leq 1$$

Algebraic:

Graphical:

I will be able to solve inequalities and write the answer in interval notation.



### Nonlinear Inequalities – Other Functions

$$x \cos x < e^x; \quad x \in [-2\pi, 2\pi]$$

Algebraic:

Graphical:

I will be able to solve inequalities and write the answer in interval notation.



### Homework:

1. Sign Test Worksheet
2. p. 11 #23 – 44

I will be able to solve inequalities and write the answer in interval notation.

