Solving Inequalities

Anton 1.1

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

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

$+3x \quad +3x$

$5 \le 7x+2$

$-2 \quad -2$

$3 \le 7x$

$\frac{3}{7} \le x$

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

Compound

$-3 \le 2x-5 \le 10$

$+5 \quad +5 \quad +5$

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

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

$[1, 15/2]$

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

Nonlinear Inequalities

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

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

Algebraic:

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

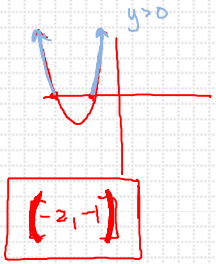
SIGN TEST/CHART

++ --- ++

-5 -2 -1.5 -1 0

$(-2,-1)$

Graphical:



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

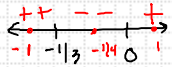
Nonlinear Inequalities

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

Algebraic:

$x(3x+1) < 0$

$x = 0, -1/3$



$(-1/3, 0)$

Graphical:

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

Nonlinear Inequalities

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

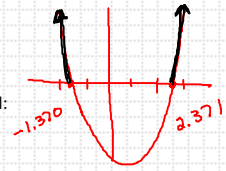
Algebraic:

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

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

DOESN'T FACTOR →

Graphical:



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

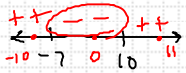
I will be able to solve inequalities and write the answer in interval notation.

Nonlinear Inequalities – Rational Functions

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

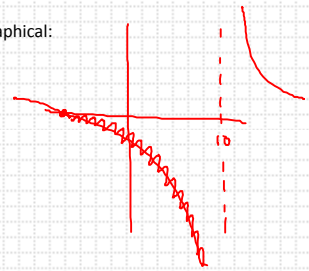
Algebraic:

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:

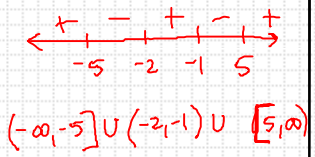
I will be able to solve inequalities and write the answer in interval notation.

Nonlinear Inequalities – Rational Functions

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

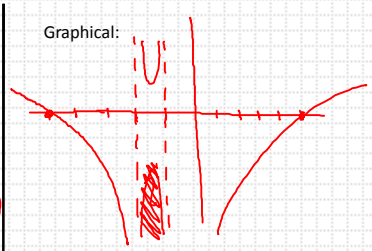
$$\frac{(x+5)(x-5)}{(x+1)(x+2)}\geq 0$$

Algebraic:



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

Graphical:



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

Nonlinear Inequalities – Rational Functions

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

$(-\infty,\tfrac{1}{3}]\cup(\tfrac{1}{2},\infty)$

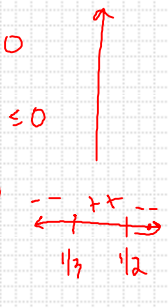
Algebraic:

$\frac{-x}{2x-1}-\frac{1}{1}\leq 0$

$\frac{-x}{2x-1}-\frac{(2x-1)}{2x-1}\leq 0$

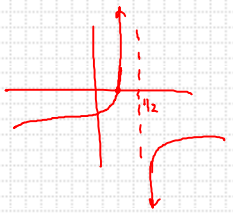
$\frac{-x-2x+1}{2x-1}\leq 0$

$\frac{-3x+1}{2x-1}\leq 0$



Graphical:

$y=\frac{-x}{(2x-1)}-1$



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

Nonlinear Inequalities – Other Functions

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

$x\cos x - e^x \geq 0$

Algebraic:

DON'T!

Graphical:

$(-4.710,\ -1.6816)$

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.