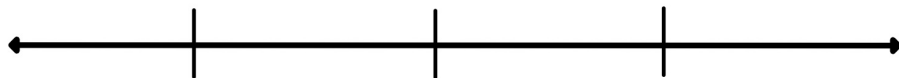## 2.5 Polynomial and Radical Inequalities
I can:

1. Solve polynomial inequalities using a sign chart.
2. Solve radical inequalities using a sign chart.

my PIN is
the last four
digits of π

This means that when the real zeros of a polynomial are put in order, they divide a number line into intervals in which the polynomial has NO sign changes.

The zeros are the <u>critical numbers</u>

The open intervals between them are the <u>test intervals</u>
for the inequality.

To solve a polynomial inequality such as

$$x^3 + 3x^2 - 6x - 8 < 0$$

use the fact that a polynomial $f(x)$ can <u>change signs</u>
ONLY at its zeros.

Between 2 consecutive zeros, a polynomial $f(x)$ must be entirely positive or entirely negative.

Finding Test Intervals for a Polynomial

To determine the intervals on which the values of a polynomial are entirely negative or entirely positive, use the following steps.

1. Find all real zeros of the polynomial, and arrange the zeros in increasing order (from smallest to largest). These zeros are the <u>critical numbers</u> of the polynomial.

2. Use the critical numbers of the polynomial to determine its test intervals.

3. Choose one representative x-value in each test interval and evaluate the polynomial at that value. If the value of the polynomial is negative, the polynomial will have negative values for every x-value in the interval. If the value of the polynomial is positive, the polynomial will have positive values for every x-value in the interval.

Ex 1: Let $f(x) = (x+3)(x^2+1)(x-4)^2$

Determine the real number values of x that cause $f(x)$ to be

a) Zero
b) positive
c) negative

<-->

Ex 2: Solve $2x^2 + 5x > 12$
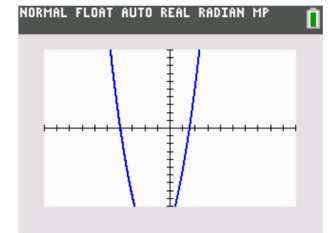
Ex 3: Solve $2x^3 - 3x^2 - 32x > -48$

Radical Inequalities

Step 2
Domain res

Ex 4: Find the solution set in interval notation:

$$\sqrt{2x-3} - 5 < 2$$

Step 1
Solve the inequality
for the variable

Radical Inequalities

You Try: Find the solution set in interval notation:

$$\sqrt{5-x} \leq 3$$

Step 1
Solve the inequality for the variable

Step 2
Domain restriction

Radical Inequalities

Ex 5: Find the solution set in interval not[a]

$$\sqrt{x^2-2x-8} > x+2$$

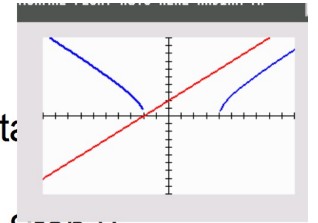**Step 1**
Solve the inequality for the variable

Step 2
Domain restriction

Radical Inequalities

You Try: Find the solution set in interval notation:

$$\sqrt{2-x} < x$$

Step 1
Solve the inequality for the variable

Step 2
Domain restriction

Radical Inequalities

Ex 6: Find the solution set in interval notation:

$$(x-3)\sqrt{x+1} \geq 0$$

The following inequalities represent "Unusual Solution Sets".
Determine the answer(s) for each inequality.

a) $x^2 + 2x + 4 > 0$

b) $x^2 + 2x + 1 \le 0$

c) $x^2 + 3x + 5 < 0$

d) $x^2 - 4x + 4 > 0$

Hint #1 -

Hint #2 -

Hint #3 -