Lesson 42: Systems of Non-Linear Equations & Inequalities

By the end of the lesson, you will be able to:

~ Solve systems of equations - linear and nonlinear

~ Solve systems of inequalities - linear and nonlinear

Solving Systems of Equations on the Calculator

1. Write down original equations.
2. Solve for y.
3. Plug in equations in the " y=" on your calculator.
4. Graph. Sketch on paper.
5. Find the solution(s). (Remember "solutions" means find the intersections. On calc: 2nd, Trace, #5 intersection .) Answers should be in point form.

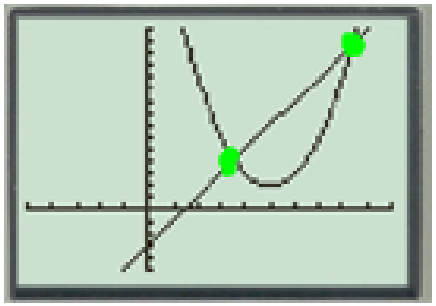
Example 1: Use your calculator to solve the system of equations. Round to 2 decimal places if needed.

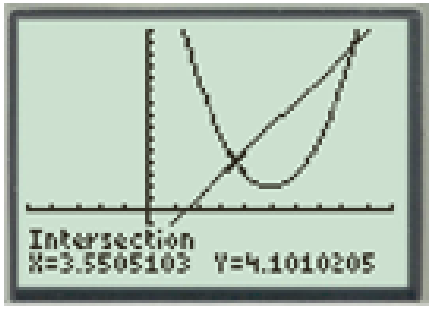
$$y = 2x - 3$$
$$y = (x - 5)^2 + 2$$

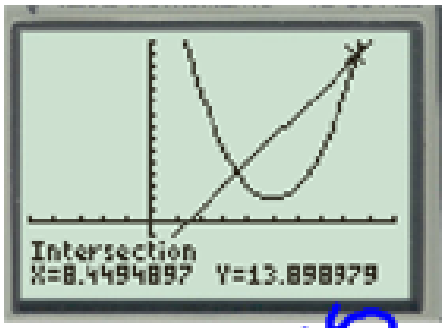
(3.55, 4.10)

(8.45, 13.90)

Change window * to see both







13.898

Example 2: Use your calculator to solve the system of equations. Round to 2 decimal places if needed.

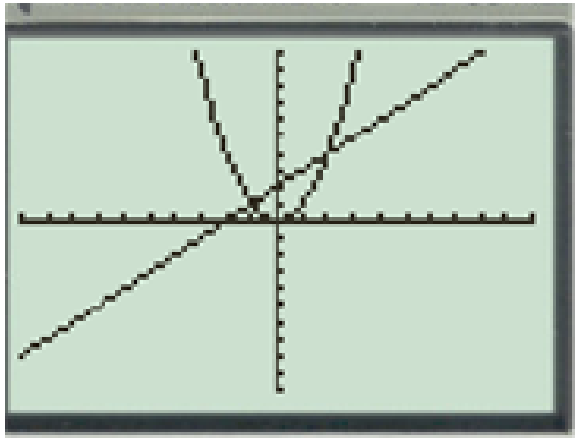
$$y + 5 = -4x$$

$$y = (x - 2)^2 + 1$$

Example 3: Use your calculator to solve the system of equations. Round to 2 decimal places if needed.

$$y = x + 2$$

$$y = x^2$$

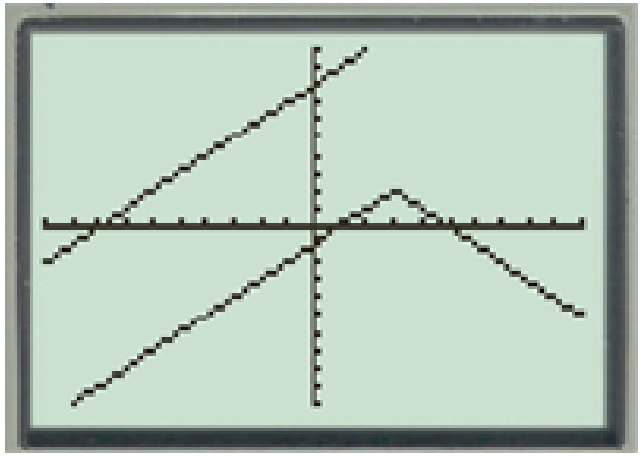


$(-1, 1)$

$(2, 4)$

Example 4: Use your calculator to solve the system of equations. Round to 2 decimal places if needed.

$$y = x + 8$$
$$y = -|x - 3| + 2$$



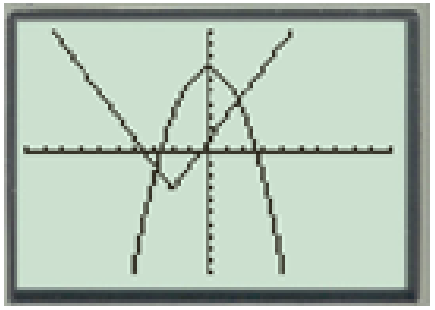
(don't cross)

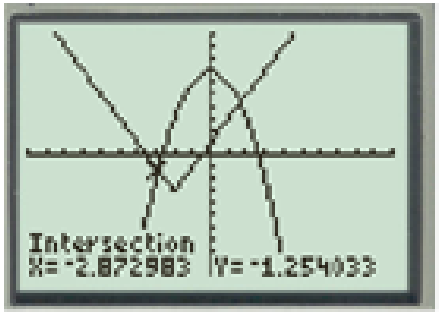
no Solution

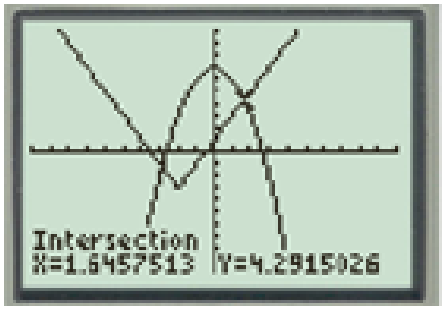
Example 5: Use your calculator to solve the system of equations. Round to 2 decimal places if needed.

$$y = 2|x + 2| - 3$$

$$y = -(x)^2 + 7$$







(-2.87, -1.25)

(1.65, 4.29)

Solve the system of Inequalities - no calculator

1. Graph each equation by hand. Some may need special points. or "t" charts
2. Decide if lines are dashed or solid.
3. Pick a test point for each equation to determine which side to shade.
4. Shade the solution. (Remember: The solution is where both shadings intersect.)

Example 1: Solve the system of inequalities.

$y \geq -2x + 9$

Test: (0,0)
$0 \geq 0 + 9$ ✗

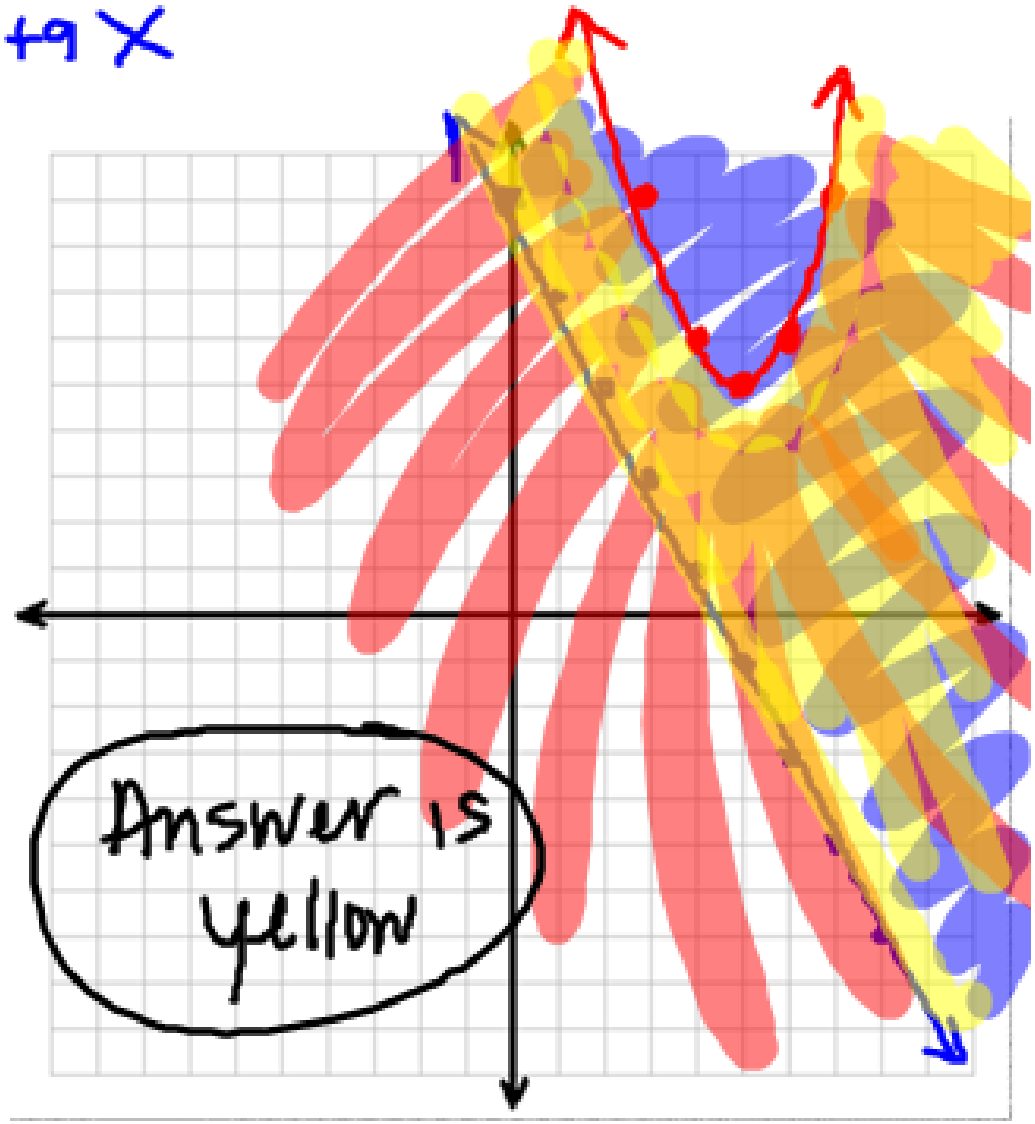
$y \leq (x-5)^2 + 5$

vertex: (5,5)

Test: (0,0)
$0 \leq (0-5)^2 + 5$
$0 \leq 30$ ✓

x	$y = (x-5)^2+5$
3	$9 = (3-5)^2+5 = (-2)^2+5$
4	$6 = (4-5)^2+5 = (-1)^2+5$
5	5
6	6
7	9

(or use special pts)



Example 2: Solve the system of inequalities.

$$y < -\frac{1}{2}x + 1$$

Test: (0,0)

$0 < 0 + 1$ ✓

$$y < |x| - 3$$

Test: (0,0)

$0 < |0| - 3$

$0 < -3$ ✗

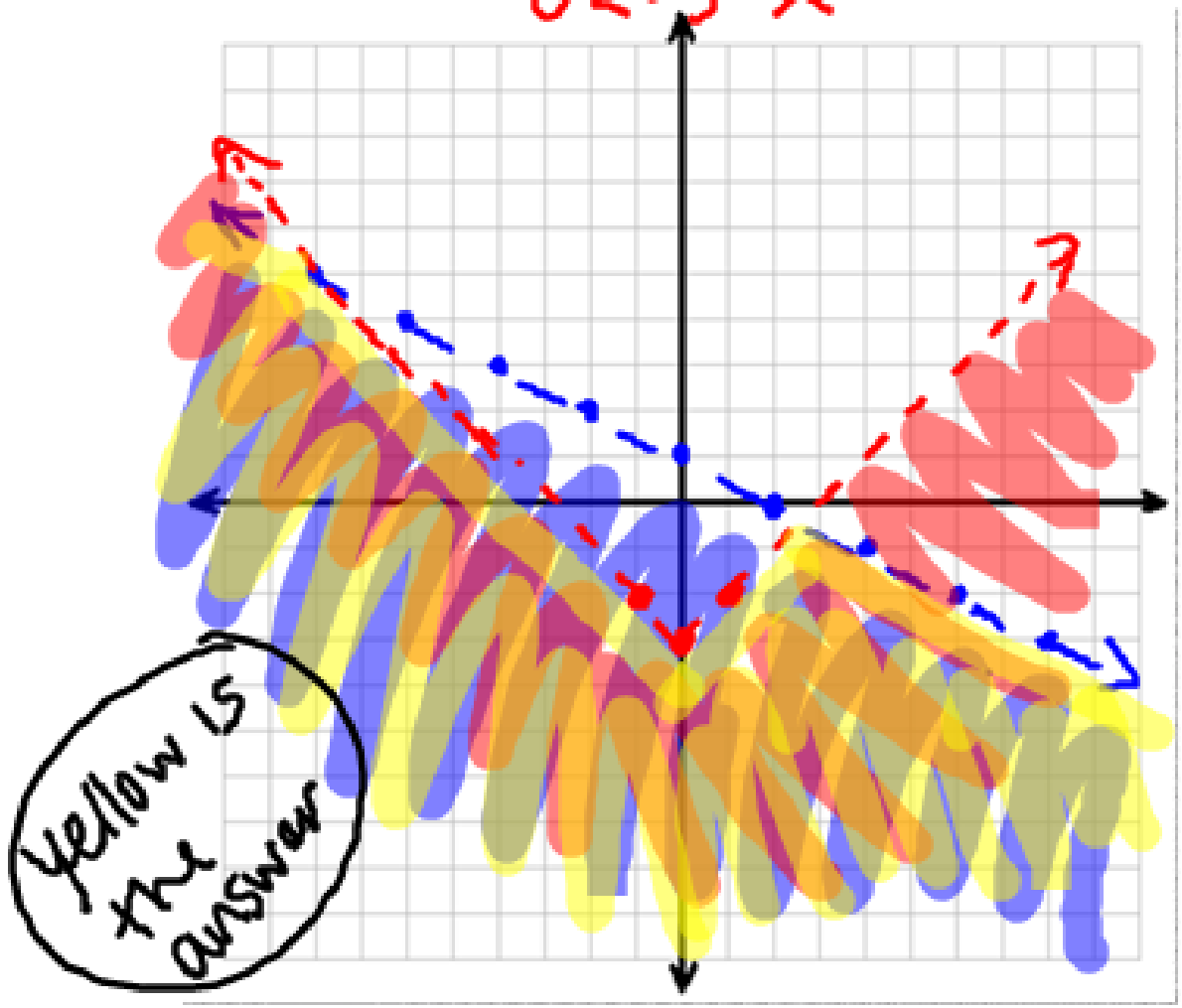
t-chart or SP

$k = -3$

$(-1,1) \rightarrow (-1,-2)$

$(0,0) \rightarrow (0,-3)$

$(1,1) \rightarrow (1,-2)$



Example 3: Solve the system of inequalities.

$$y \leq -|x| + 3$$

$$y > (x+5)^2 - 5$$

Test (0,0)

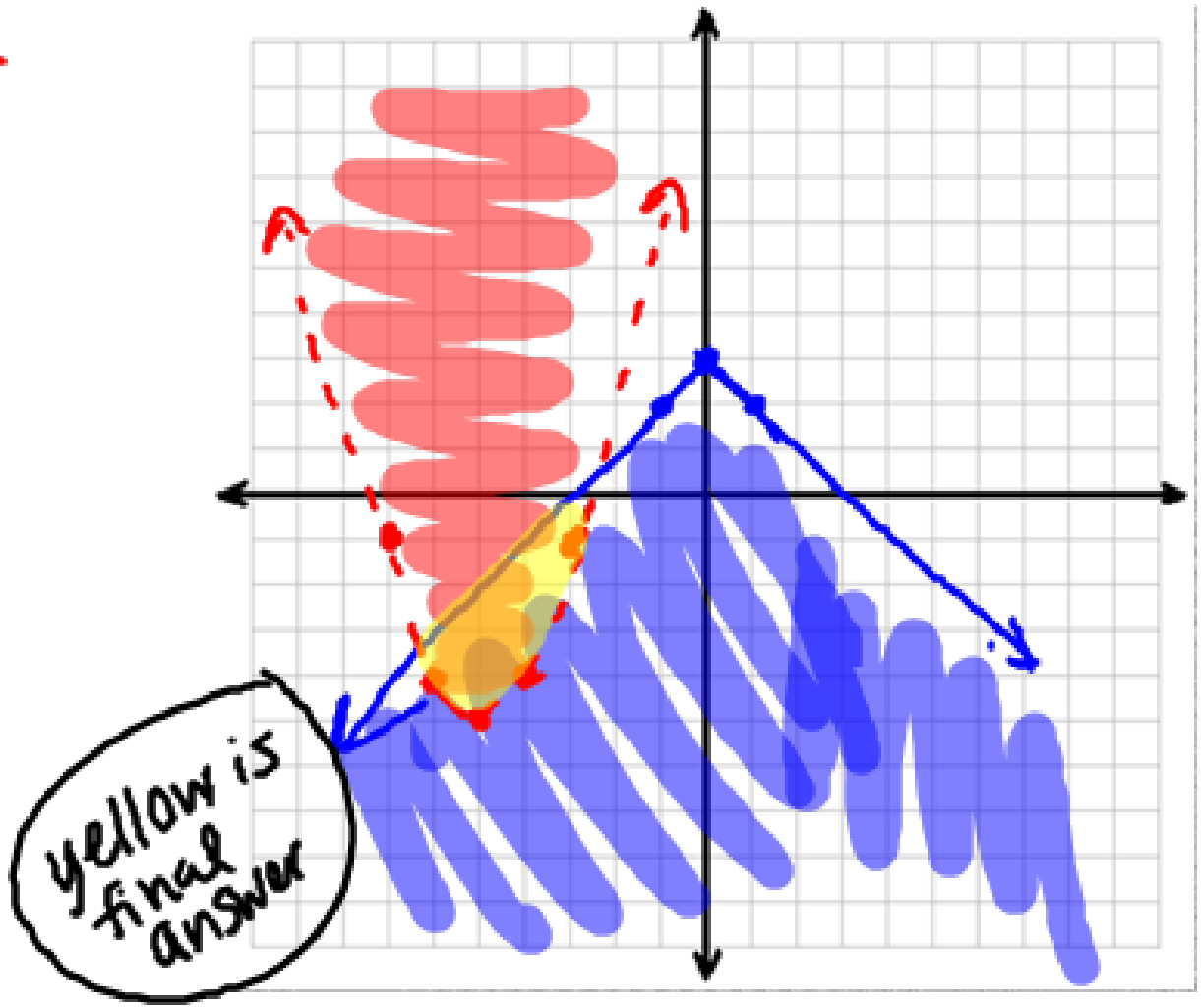
$0 \leq -|0| + 3$

$0 \leq 3$ ✓

Test: (0,0)

$0 > (0+5)^2 - 5$

$0 > 20$ ✗



Example 3: Solve the system of inequalities. (WORK)

we shade down

$$y \leq -|x| + 3$$

Vertex: (0, 3)

h = 0 y(-1) k = 3

(-1, 1) → (-1, -1) → (-1, 2)

(0, 0) → (0, 0) → (0, 3)

(1, 1) → (1, -1) → (1, 2)

Test (0, 0)

$$y > (x+5)^2 - 5$$

t-chart way V: (-5, -5)

x	y = (x+5)² − 5
-7	-1 = (-7+5)² − 5 = (-2)² − 5
-6	-4 = (-6+5)² − 5 = (-1)² − 5
-5	-5
-4	-4
-3	-1

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By the end of the lesson, you will be able to:

~ Solve systems of equations - linear and nonlinear

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Can you?

Homework:

Assignment 42

(Due day after test)

Instructions: Write down original problem and show work. Sketch graphs.

&

Test 10 Review worksheet

(Due next time)

Test next time!!!