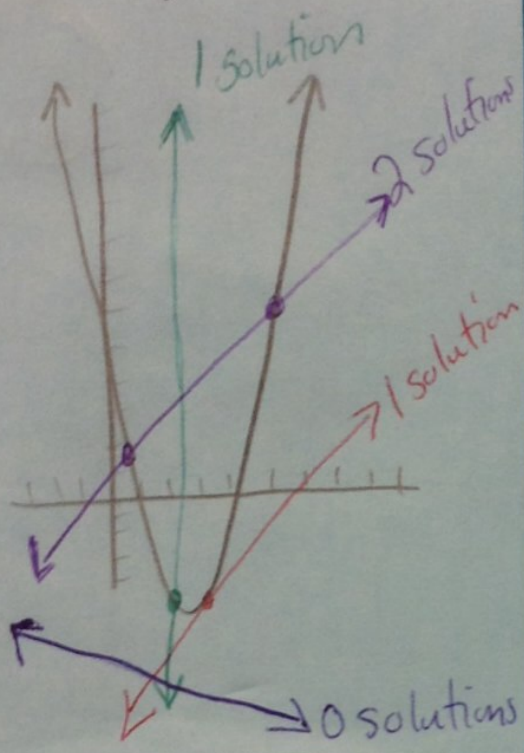
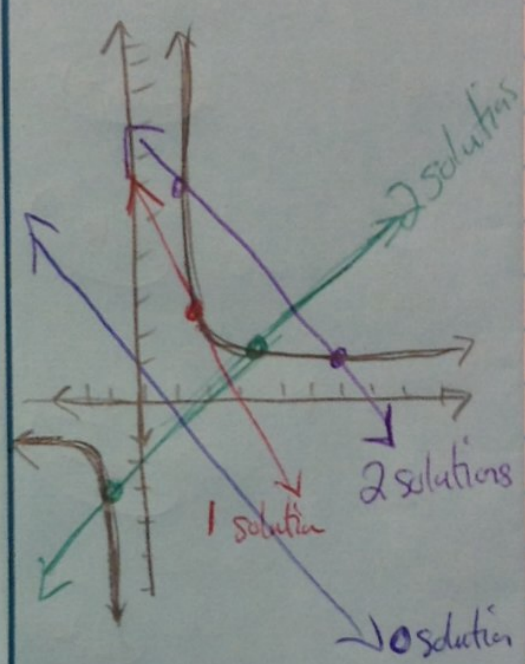


# #16 Nonlinear Systems

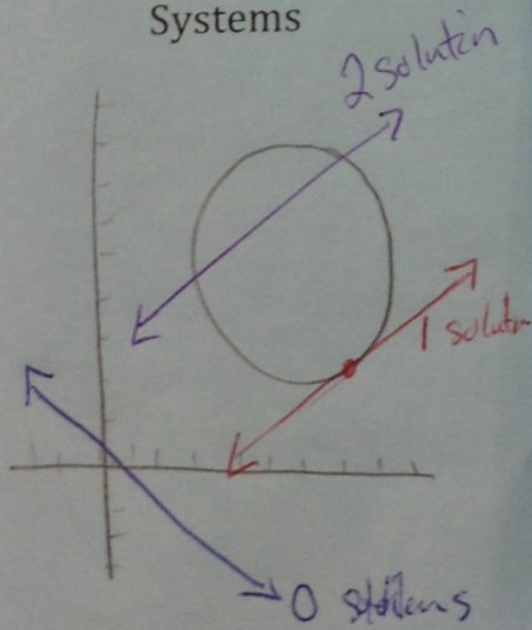
## Line and Parabola Systems



## Line and Inverse Systems



## Line and Circle Systems



## Practice on the Calculator

### Steps

- ① Graph equation in  $y =$
- ② Zoom so you can see all intersection points
- ③ 2nd, TRACE, #5
- ④ Move the cursor closer to each solution and press Enter 3 times

# #16 Nonlinear System

Since they are both equal to  $y \rightarrow$

Example

$$y = 2x + 1$$

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

$$2x + 1 = x^2 - 2x + 1$$

$$1 = x^2 - 4x + 1$$

$$0 = x^2 - 4x$$

$$0 = x(x - 4)$$

$$x = 0$$

$$x - 4 = 0$$

$$x = 4$$

Example  $y = 9$

$$y = -x^2 + 2x + 8$$

$$9 = -x^2 + 2x + 8$$

$$0 = -x^2 + 2x - 1$$

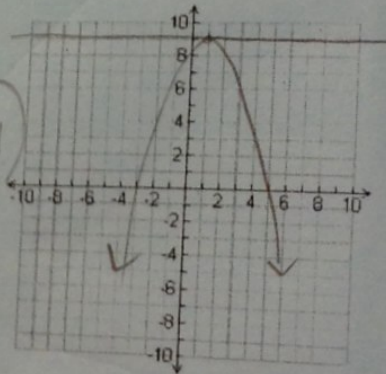
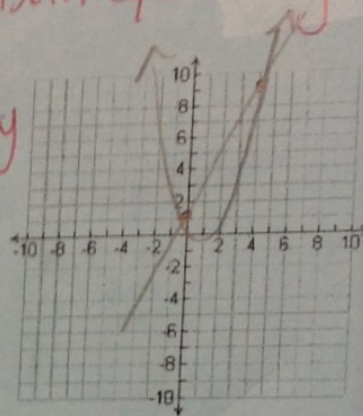
$$0 = -(x^2 - 2x + 1)$$

$$-(x - 1)(x - 1)$$

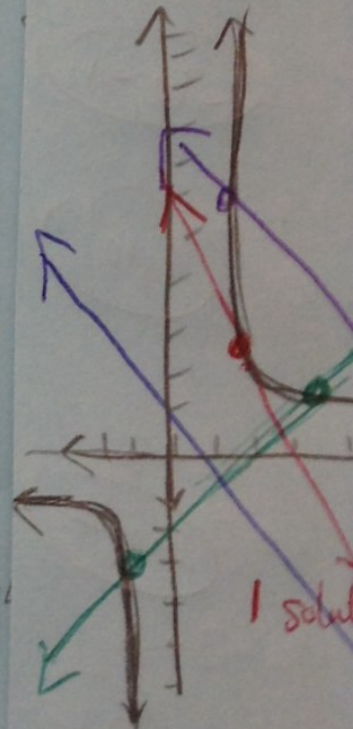
$$x - 1 = 0$$

$$x = 1$$

$$1, 9$$



Line and  
System

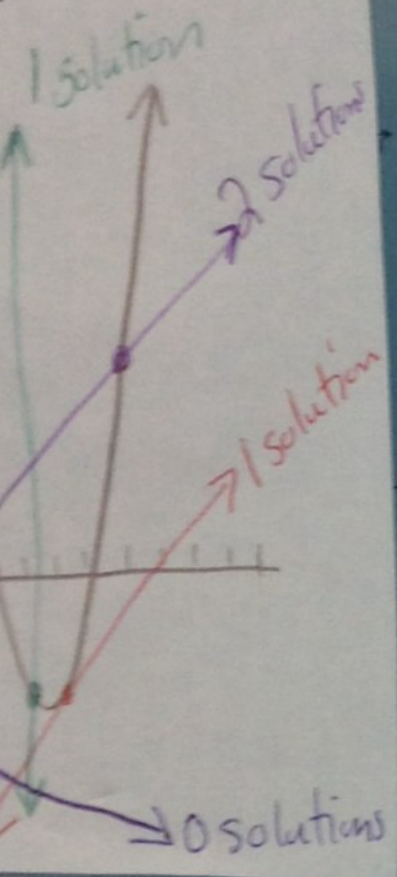


Line and Circle  
Systems

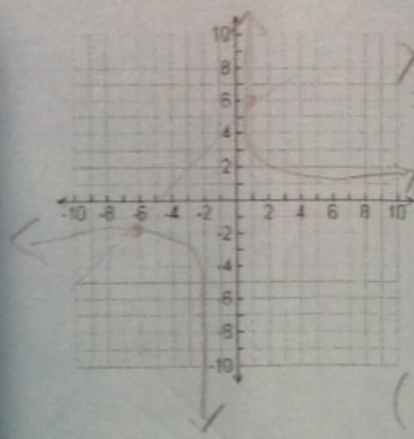
Practic

# #16 Nonlinear Systems

## Line and Parabola Systems



→ Set them equal to each other

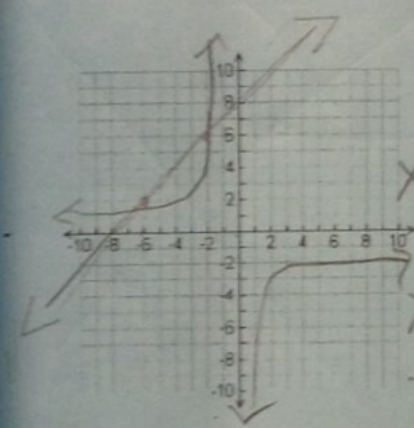


Example  
 $x(x+5) = \left(\frac{-6}{x}\right)x$

$x^2 + 5x = -6$   
 $x^2 + 5x + 6 = 0$   
 $(x+6)(x+1) = 0$   
 $x = -6, -1$

$y = x + 5$   
 $y = \frac{6}{x}$

plug in x, solve for y  
 $y = -6 + 5 = -1$   
 $y = 1 + 5 = 6$   
 Solutions:  $(-6, -1)$  and  $(1, 6)$



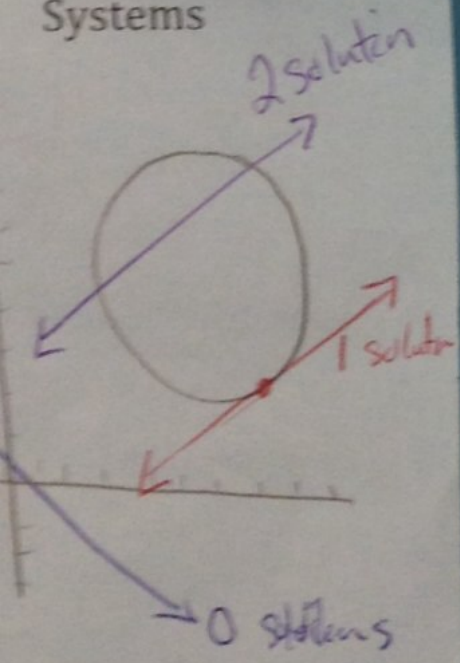
Example  
 $x(x+8) = \left(\frac{-12}{x}\right)x$

$x^2 + 8x = -12$   
 $x^2 + 8x + 12 = 0$   
 $(x+6)(x+2) = 0$   
 $x = -6, -2$

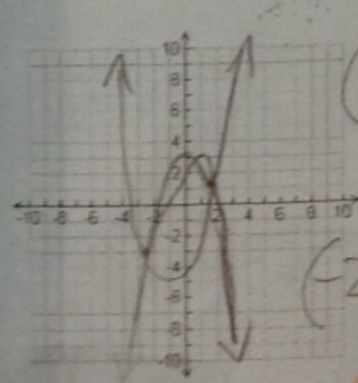
$y = x + 8$   
 $y = \frac{-12}{x}$

plug in x, solve for y  
 $y = -6 + 8 = 2$   
 $y = -2 + 8 = 6$   
 Solutions:  $(-6, 2)$  and  $(-2, 6)$

## Line and Circle Systems

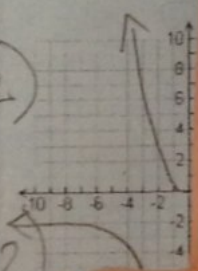


Example  
 $y = x^2 + 2x - 5$   
 $y = -x^2 + 4$



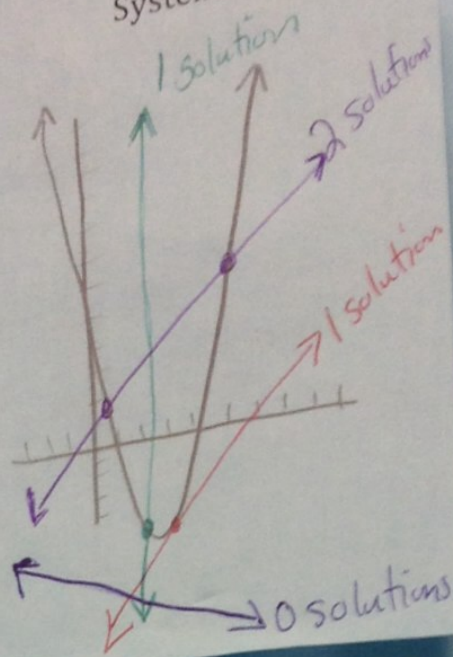
$(1.7, 1.2)$   
 $(-2.7, -3.2)$

Example

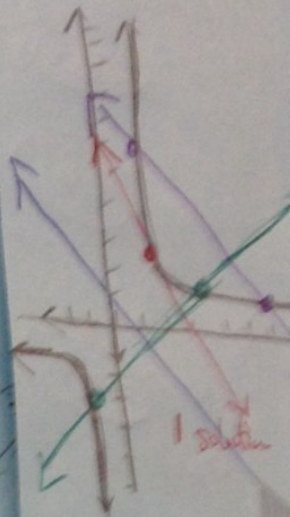


$(2.3, 5.2)$

### Line and Parabola Systems



### Line and Inverse Systems



Example

$$y = x + 5$$

$$x^2 + y^2 = 25$$

$$x^2 + (x+5)^2 = 25$$

$$x^2 + (x+5)(x+5) = 25$$

$$x^2 + x^2 + 5x + 5x + 25 = 25$$

$$2x^2 + 10x + 25 = 25$$

$$2x^2 + 10x = 0$$

$$2x(x+5) = 0$$

$$2x = 0$$

$$x = 0$$

$$y = 0 + 5$$

$$y = 5$$

$$x + 5 = 0$$

$$x = -5$$

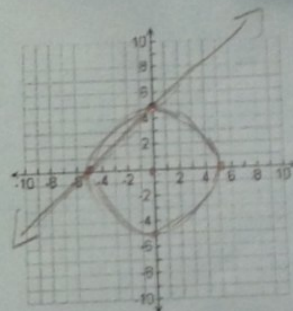
Plugin x to find y

$$y = -5 + 5$$

$$y = 0$$

$$(0, 5)$$

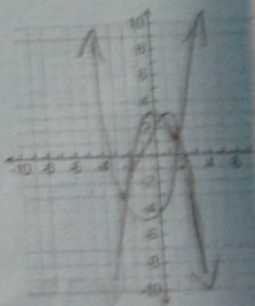
$$(-5, 0)$$



Example

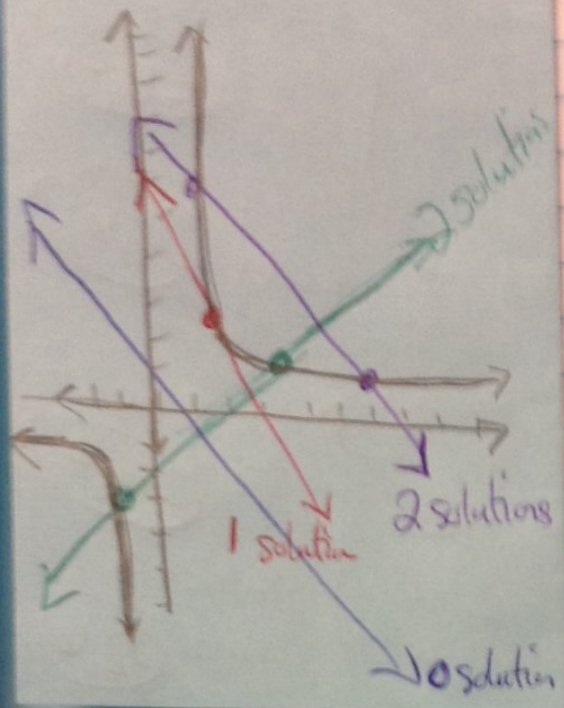
$$y = x$$

$$y = -$$

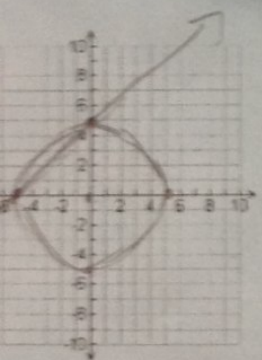


parabola  
ms  
solutions  
→ 2 solutions  
→ 1 solution  
→ 0 solutions

### Line and Inverse Systems

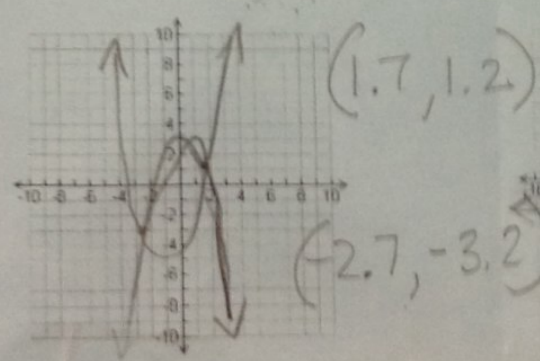


$x = -6, -2$

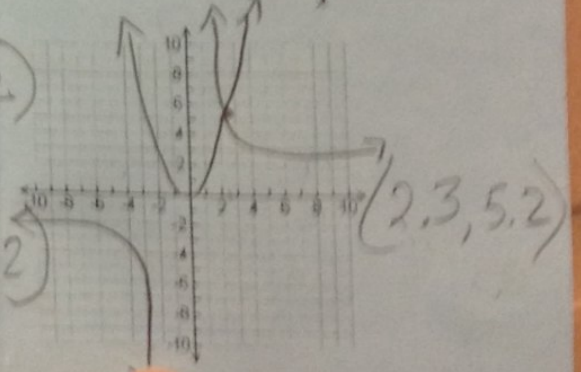


$s = 6$   
 $x = -5$   
Plugin  $x$  to find  $y$   
 $y = -5 + 5$   
 $y = 0$   
**-50**

Example  $y = x^2 + 2x - 5$   
 $y = -x^2 + 4$



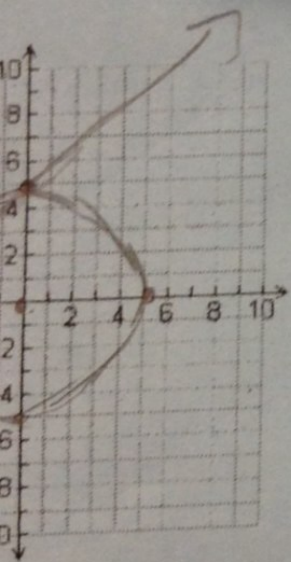
Example  $y = x^2$   
 $y = \frac{12}{x}$



## Practice on the Calculator

### Steps

- ① Graph equations in  $y =$
- ② Zoom so you can see all intersection points
- ③ 2<sup>nd</sup>, TRACE, #5
- ④ Move the cursor closer to each solution and press Enter 3 times



Plug in  $x$   
to find  $y$

5+5  
0

$-50$