

**HW 3 - 3: Answers**

1.  $\{(2, 1)\}$

4.  $(x - 2)^2 + (y + 3)^2 = 16$

2.  $\{(-2, -3), (1, 3)\}$

$\{(2, 1), (-2, -3)\}$

3.  $\{(2, 1)\}$

5.  $x = 1, y = -1, z = 2$

I'll go over both HW 3-3 & HW 3-4 tomorrow

1. a. Solve graphically:

$$x + 2y = 4 \rightarrow y = -\frac{1}{2}x + 2$$

$$-3x + y = -5 \rightarrow y = 3x - 5$$

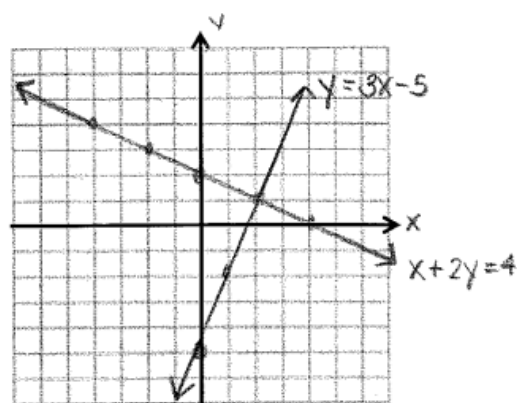
$$m = -1/2$$

$$m = 3$$

$$(2, 1)$$

$$b = 2$$

$$b = -5$$



b. Solve the same system algebraically.

$$3(x + 2y = 4)$$

$$-3x + y = -5$$

$$3x + 6y = 12$$

$$-3x + y = -5$$

$$7y = 7$$

$$y = 1$$

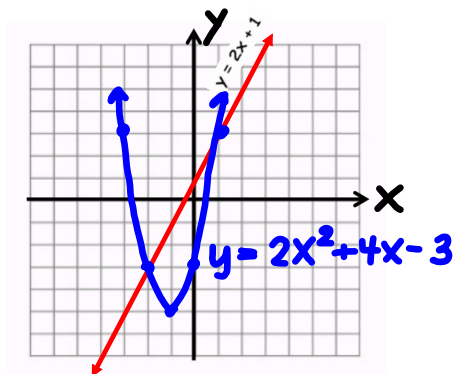
$$x + 2 = 4$$

$$x = 2$$

$$(2, 1)$$

Solve graphically. Be sure to include all required parts.

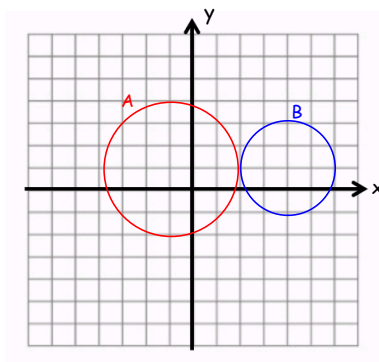
$$y = 2x + 1$$
$$y = 2x^2 + 4x - 3$$



3. A:  $(x+1)^2 + (y-1)^2 = 16$

B:  $(x-4)^2 + (y-1)^2 = 4$

Answer:  $\{(2, 1)\}$



4.  $x^2 + y^2 - 4x + 6y - 3 = 0$

$x - y = 1$

$x^2 - 4x + 4 + y^2 + 6y + 9 = 3 + 4 + 9$

$(x-2)^2 + (y+3)^2 = 16$

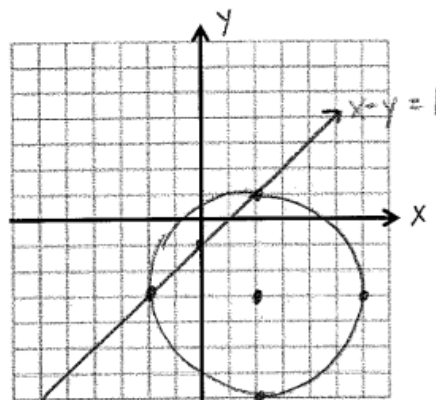
center:  $(2, -3)$ 

radius: 4

$y = x - 1$

$m = 1$

$b = -1$



$\{(2, 1), (-2, -3)\}$

5. Solve the following system of equations algebraically.

①  $2x - y + 3z = 9$

②  $x + 4y + 4z = 5$

③  $3x + 2y + 2z = 5$

elim  
y's

$-2(①) + ③$

$-14x - 16z = -46$

$9x + 16z = 41$

$-5x = -5$

$x = 1$

$7 + 8z = 23$

$8z = 16$

$z = 2$

Solve  
2 var, 2 EQ  
system

$$\begin{aligned} x &= 1 \\ y &= -1 \\ z &= 2 \end{aligned}$$

2① &amp; ③

$4x - 2y + 6z = 18$

$3x + 2y + 2z = 5$

$7x + 8z = 23$  ⑦

4① &amp; ②

$8x - 4y + 12z = 36$

$x + 4y + 4z = 5$

$9x + 16z = 41$  ⑤

$① 2(1) + y + 3(2)$

$2 - y + 6 = 9$

$y = -1$

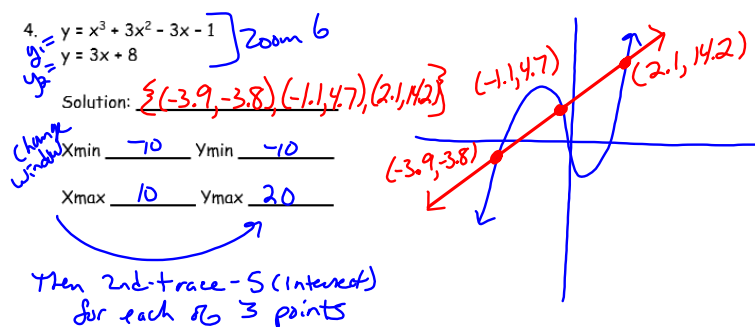
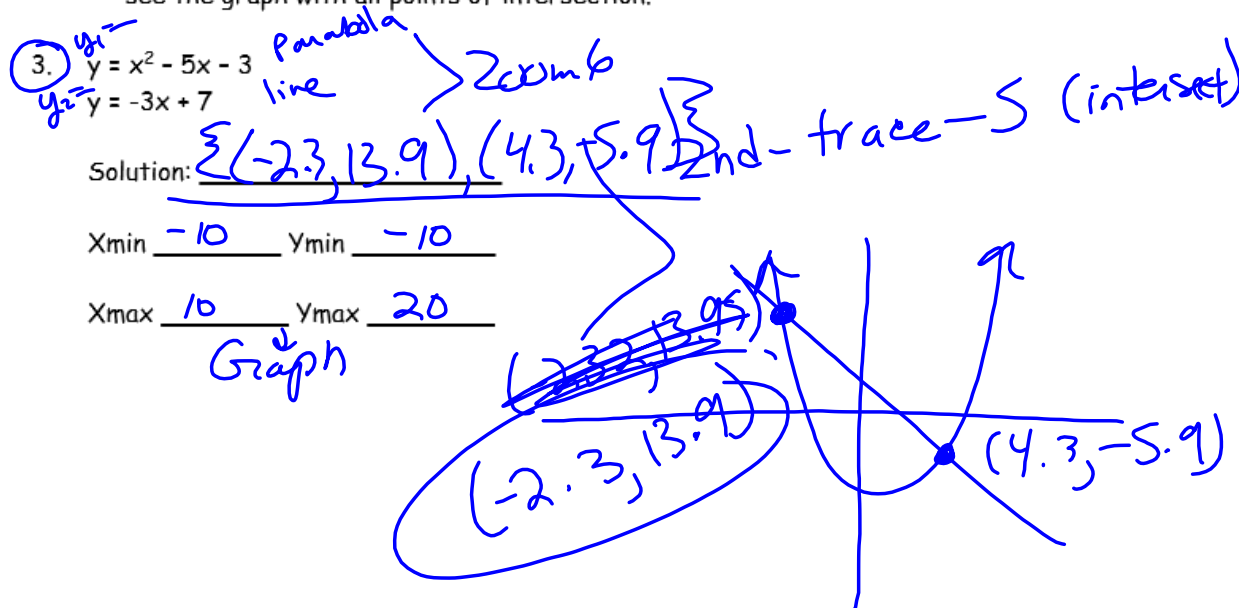
# ***QUIZ***

**Back to U3D3**

## **Solving Systems**

### **Graphically**

3 & 4. Find the solutions to the nearest tenth using your graphing calculator.  
Include a sketch with labeled points of intersection and the window you used to see the graph with all points of intersection.



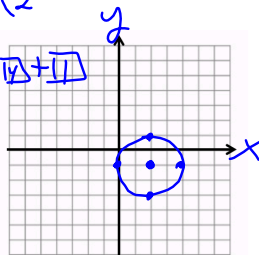
Rewrite the equation of the circle by completing the square in both x and y. Describe and graph the circle represented by the equation.

$$(x-h)^2 + (y-k)^2 = r^2 \quad \left(\frac{b}{2}\right)^2$$

$$5. \underline{x^2} + y^2 - \underline{4x} + 2y + 1 = 0$$

$$\underline{x^2 - 4x + 4} + \underline{y^2 + 2y + 1} = -1 + 4 + 1$$

$$(x-2)^2 + (y+1)^2 = 4$$



Center: (2, -1)

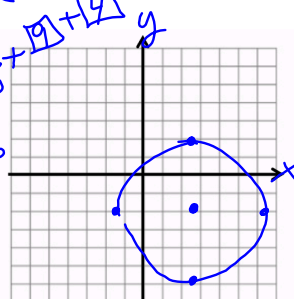
Radius: 2

$$(x-h)^2 + (y-k)^2 = r^2$$

$$6. \underline{x^2} + y^2 - \underline{6x} + 4y - 3 = 0$$

$$\underline{x^2 - 6x + 9} + \underline{y^2 + 4y + 4} = 3 + 9 + 4$$

$$(x-3)^2 + (y+2)^2 = 16$$



Center: (3, -2)

Radius: 4

## U3D4

# Solving Systems Algebraically

~~Solve the two equations from yesterday algebraically.~~

Steps to consider:

1. Solve the linear equation for x or y.
2. Substitute into the circle (or parabola) equation.
3. Solve.
4. Substitute your answer into the linear equation to solve for the remaining variable.
5. Express your answer as points in solution ie  $\{(2, 3), (-1, 4)\}$

1.  $x^2 + y^2 = 25$  circle / line  
 $4x + 3y = 0 \rightarrow \frac{3y}{3} = \frac{-4x}{3} \Rightarrow y = \left(\frac{-4}{3}x\right)$

$$x^2 + \left(\frac{-4}{3}x\right)^2 = 25$$

$$\left(x^2 + \frac{16}{9}x^2 = 25\right) 9$$

$$9x^2 + 16x^2 = 225$$

$$25x^2 = 225$$

$$\frac{25}{25} \frac{x^2}{x^2} = \frac{225}{25}$$

$$x = \pm 3$$

$$x = 3$$

$$4(3) + 3y = 0$$

$$3y = -12 \rightarrow y = -4$$

$$x = -3$$

$$4(-3) + 3y = 0$$

$$-12 + 3y = 0$$

$$3y = 12 \rightarrow y = 4$$

$$\{(3, -4), (-3, 4)\}$$

2.  $(x-2)^2 + (y+3)^2 = 4$  circle / line system → Substitution  
 $x - y = 3 \rightarrow x = y + 3$

$$(y+3-2)^2 + (y+3)^2 = 4$$

$$(y+1)^2 + (y+3)^2 = 4$$

$$\underline{y^2 + 2y + 1} + \underline{y^2 + 6y + 9} = 4$$

$$2y^2 + 8y + 10 = 4$$

$$\underline{2y^2 + 8y + 6 = 0}$$

$$\frac{2y^2 + 8y + 6}{2} = \frac{0}{2}$$

$$y^2 + 4y + 3 = 0$$

$$(y+1)(y+3) = 0$$

$$y = -1 \quad y = -3$$

$$* (y+1)^2 = (y+1)(y+1) = y^2 + y + y + 1$$

$$= y^2 + 2y + 1$$

$$* (y+3)^2 = (y+3)(y+3) = y^2 + 3y + 3y + 9$$

$$= y^2 + 6y + 9$$

$$y = -1$$

$$x - y = 3$$

$$x - (-1) = 3$$

$$x + 1 = 3$$

$$x = 2$$

$$(2, -1)$$

$$y = -3$$

$$x - y = 3$$

$$x - (-3) = 3$$

$$x + 3 = 3$$

$$x = 0$$

$$(0, -3)$$

$$\{(2, -1), (0, -3)\}$$



Solve the systems algebraically:

3.  $y = 4x + 6$

$y = (x + 4)^2 - 10$

~~$y = 4x + 6 = (x + 4)^2 - 10$~~

$4x + 6 = x^2 + 8x + 16 - 10$

$$\begin{array}{r} 4x + 6 = x^2 + 8x + 16 - 10 \\ -4x \quad -6 \quad -4x \quad -6 \\ \hline \end{array}$$

$x^2 + 4x = 0$

$x(x + 4) = 0$

$x = 0 \quad | \quad x = -4$

$x = 0$

$y = 4(0) + 6$

$y = 6$

$x = -4$

$y = 4(-4) + 6$

$y = -16 + 6$

$y = -10$

$(x + 4)^2$

$(x + 4)(x + 4)$

$x^2 + 4x + 4x + 16$

$x^2 + 8x + 16$

$\{(0, 6), (-4, -10)\}$

parabola/line

4.  $y = x^2 - 6x + 3$

$y = 2x - 13$

Set =

$x^2 - 6x + 3 = 2x - 13$

$$\begin{array}{r} x^2 - 6x + 3 = 2x - 13 \\ -2x + 13 \quad -2x + 13 \\ \hline \end{array}$$

$x^2 - 8x + 16 = 0$

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

$x = 4 \quad | \quad x = 4$

$y = 2x - 13$

$y = 2(4) - 13$

$y = 8 - 13$

$y = -5$

$\{(4, -5)\}$

5. Solve the system of equations algebraically for x and y.

*Cross multiply*

$$\frac{y}{x} = \frac{x-3}{2} \rightarrow 2y = x^2 - 3x \rightarrow y = \frac{x^2 - 3x}{2}$$

$$y + 2 = x \rightarrow y = x - 2$$

*Set =*

$$\frac{x-2}{1} = \frac{x^2-3x}{2} \quad \text{cross multiply}$$

$$\begin{array}{r} 2x-4 = x^2-3x \\ -2x+4 \quad -2x+4 \\ \hline x^2-5x+4=0 \\ (x-1)(x-4)=0 \\ \hline x=1 \quad | \quad x=4 \end{array}$$

$$\begin{array}{l} x=1 \\ y+2=1 \\ y=-1 \end{array} \quad (1, -1)$$

$$\begin{array}{l} x=4 \\ y+2=4 \\ y=2 \end{array} \quad (4, 2)$$

$$\{(1, -1), (4, 2)\}$$