

Show all work for each question, full credit will be given only if all work is shown. Each question is equal in value. Clearly indicate your answers. Good luck!

1. Find the number of points of intersection of the graphs by looking at the graph.

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

$$2x + y = 1$$

- a. 4 b. 3 **c. 2** d. 1 e. 0

2. Solve the system of equations by the substitution method. Show all work.

$$y = \frac{1}{x}$$

$$x + 5y = 6$$

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

$$x^2 + 5 = 6x$$

$$x^2 - 6x + 5 = 0$$

$$(x-5)(x-1) = 0$$

$$x = 5 \quad x = 1$$

$x = 5$	$x = 1$
$y = \frac{1}{5}$	$y = \frac{1}{1} = 1$
$(5, \frac{1}{5})$	$(1, 1)$

3. Solve the system of equations by the elimination method. Show all work.

$$2x - 5y = -4$$

$$4x + 3y = 5$$

$$\begin{array}{r} -4x + 10y = 8 \\ 4x + 3y = 5 \\ \hline 13y = 13 \\ y = 1 \end{array}$$

$$2x - 5(1) = -4$$

$$2x - 5 = -4$$

$$2x = 1$$

$$x = \frac{1}{2}$$

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

4. Solve the system of equations using any method. Show all work.

$$x + y = 4$$

$$x^2 - y = 2$$

$$y = 4 - x$$

$$x^2 + x = 6$$

$$x^2 + x - 6 = 0$$

$$(x+3)(x-2) = 0$$

$$x = -3 \quad x = 2$$

$x = -3$	$x = 2$
$-3 + y = 4$	$2 + y = 4$
$y = 7$	$y = 2$
$(-3, 7)$	$(2, 2)$

5. Solve the system of equations using any method. Show all work.

$$-2(3.5x - 2y = 2.6)$$

$$7x - 2.5y = 4$$

$$-7x + 4y = -5.2$$

$$+1.5y = -1.2$$

$$15y = -12$$

$$y = -12/15$$

$$y = -4/5$$

$$7x + \frac{10}{5}y = 4$$

$$7x + 2 = 4$$

$$7x = 2$$

$$x = \frac{2}{7}$$

$$\left(\frac{2}{7}, -\frac{4}{5}\right)$$

6. Solve the system of equations by the elimination method. Show all work.

(Hint: answers will be integers) 3 pts.

$$2x + y - z = 13$$

$$x + 2y + z = 2$$

$$8x - 3y + 4z = -2$$

$$\begin{array}{r} \downarrow \\ x + 2y + z = 2 \\ 2x + y - z = 13 \quad -2R_1 + R_2 \\ \hline 8x - 3y + 4z = -2 \end{array}$$

$$\begin{array}{r} \downarrow \\ x + 2y + z = 2 \\ -3y - 3z = 9 \quad -8R_1 + R_3 \\ \hline 8x - 3y + 4z = -2 \end{array}$$

$$\begin{array}{r} \downarrow \\ x + 2y + z = 2 \\ -3y - 3z = 9 \\ -8x - 16y - 8z = -16 \end{array}$$

$$\begin{array}{r} \downarrow \\ x + 2y + z = 2 \\ -3y - 3z = 9 \quad R_2 \div 3 \\ -19y - 4z = -18 \end{array}$$

$$\begin{array}{r} \downarrow \\ x + 2y + z = 2 \\ y + z = -3 \quad 19R_2 + R_3 \\ -19y - 4z = -18 \\ \hline 19y + 19z = -57 \end{array}$$

$$\begin{array}{r} x + 2y + z = 2 \\ y + z = -3 \quad R_3 \div 15 \\ \hline 15z = -15 \end{array}$$

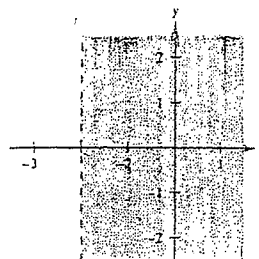
$$\begin{array}{r} x + 2y + z = 2 \\ y + z = -3 \\ \hline z = -5 \end{array}$$

$$\begin{array}{r} y + -5 = -3 \\ y = 2 \end{array}$$

$$\begin{array}{r} x + 2(2) + -5 = 2 \\ x + 4 - 5 = 2 \\ x + -1 = 2 \\ x = 3 \end{array}$$

$$\left(3, 2, -5\right)$$

7. Match the graph with the correct inequality:



a. $y > -2$

b. $y < -2$

c. $x > -2$

d. $x < -2$

e. none of these

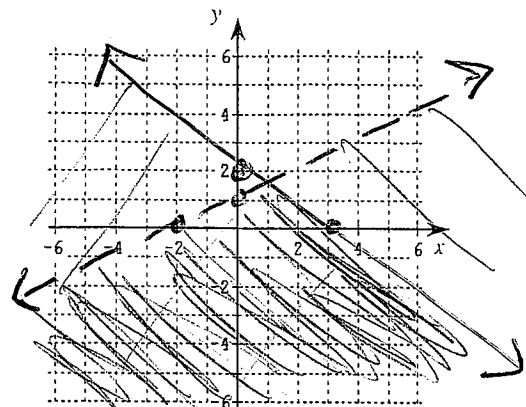
8. Sketch the system of inequalities:

$2x + 3y \leq 6$

solid

$x - 2y > -2$

dashed

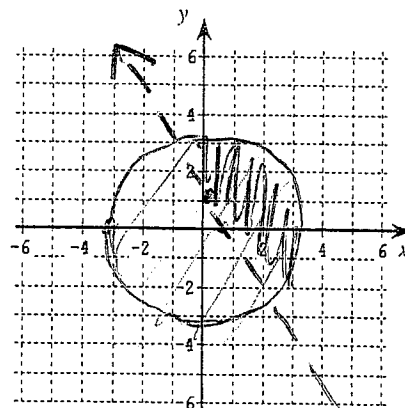


9. Sketch the system of inequalities:

$x^2 + y^2 \leq 9$

circle r = 3

$2x + y > 1$



10. Determine the critical values for the given constraints:

$x \geq 0$

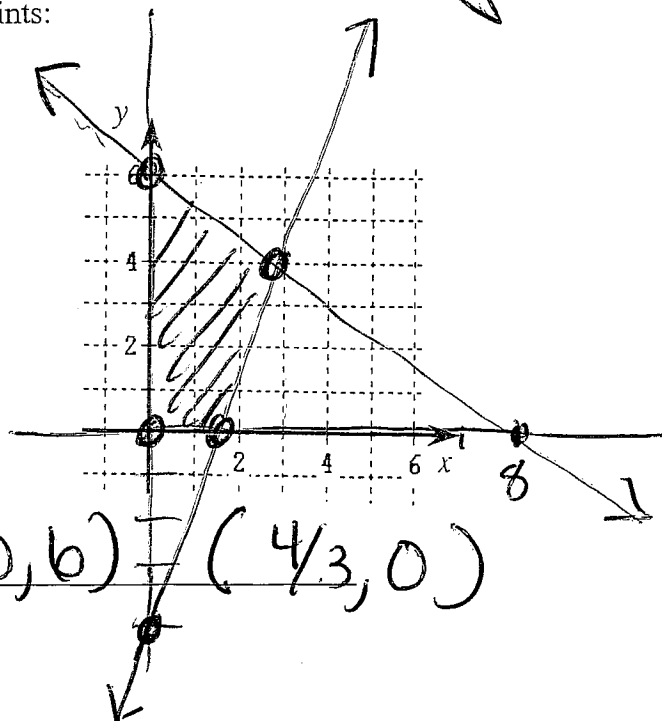
$y \geq 0$

$3x + 4y \leq 24$

$3x - y \leq 4$

$$\begin{array}{r} 3x + 4y = 24 \\ -3x + y = -4 \\ \hline 5y = 20 \\ y = 4 \end{array}$$

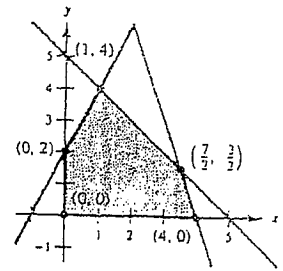
$$\begin{array}{r} 3x - 4 = 4 \\ 3x = 8 \\ x = 8/3 \end{array}$$



Critical values: $(8/3, 4)$ $(0, 0)$ $(0, 6)$ $(4/3, 0)$

11. Find the **maximum value** of the objective function $z = 10x + 8y$ subject to the constraints shown below.

$$\begin{aligned} (1, 4) & \quad 10(1) + 8(4) = 42 \\ (0, 2) & \quad 10(0) + 8(2) = 16 \\ (0, 0) & \quad 10(0) + 8(0) = 0 \\ (7/2, 3/2) & \quad 10(7/2) + 8(3/2) = 47 \end{aligned}$$



Maximum value is 47 and occurs at point $(7/2, 3/2)$

* At least 350 model I and 280 model II must be produced

12. A company produces two models of calculators at two different plants. In one day Plant A can produce 60 of model I and 70 of model II. In one day, Plant B can produce 80 of model I and 40 of model II. Assume it costs \$1200 per day to operate Plant A and \$900 per day for Plant B. Write the **objective function and the constraints**. DO NOT SOLVE.

Objective function: $C = 1200A + 900B$

Constraints: $A \geq 0$
 $B \geq 0$

$$\begin{aligned} 60A + 80B & \geq 350 \\ 70A + 40B & \geq 280 \end{aligned}$$