

1. Solve the following systems by **substitution**.

a)  $x - y = -3$   $X = y - 3$   $(-2, 1)$   
 $3x + 8y = 2$

$3(y - 3) + 8y = 2$   
 $3y - 9 + 8y = 2$   
 $11y = 11$   $y = 1$   $X = 1 - 3$   
 $X = -2$

b)  $x + 2y = 0$   $X = -2y$   $(-6, 3)$   
 $x + y = -3$

$-2y + y = -3$   
 $-y = -3$   
 $y = 3$   $X = -2(3)$   
 $X = -6$

c)  $y = 3x + 5$   $(-1, 2)$   
 $x + y = 1$

$X + 3x + 5 = 1$   
 $4x + 5 = 1$   
 $4x = -4$   
 $X = -1$   $y = 3(-1) + 5$   
 $y = -3 + 5$   
 $y = 2$

2. Solve the following system by **elimination**.

a)  $3(2x - 4y = 4)$   $(0, -1)$   
 $-6x + 5y = -5$

$+ 6x - 12y = 12$   
 $-7y = 7$   
 $y = -1$   $2x - 4(-1) = 4$   
 $2x + 4 = 4$   
 $2x = 0$   
 $x = 0$

b)  $9x - 5y = -30$   $(0, 6)$   
 $-9(x + 2y = 12)$

$-9x - 18y = -108$   
 $-23y = -138$   
 $y = 6$   $x + 2(6) = 12$   
 $x + 12 = 12$   
 $x = 0$

c)  $10(7x + y = -17)$   $(-2, -3)$   
 $3x - 10y = 24$

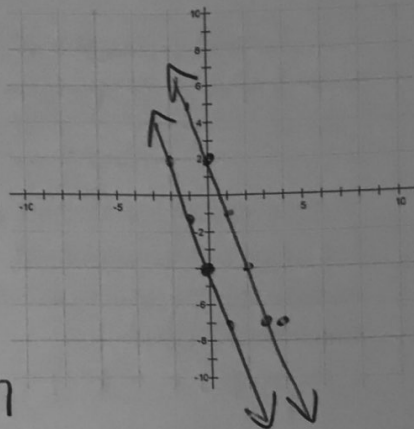
$+ 70x + 10y = -170$   
 $73x = -146$   
 $x = -2$   $7(-2) + y = -17$   
 $-14 + y = -17$   
 $y = -3$

3. Solve the following system of equations by **graphing**.

a)  $3x + y = 2$   
 $6x + 2y = -8$

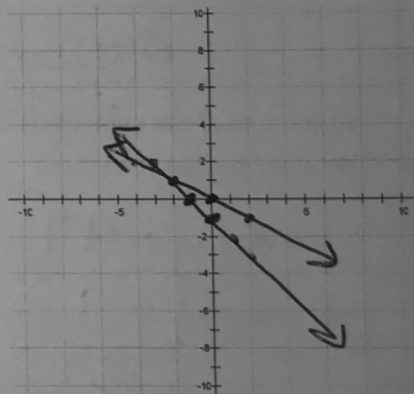
$y = -3x + 2$   
 $2y = -6x - 8$   
 $y = -3x - 4$

$(\text{no solution})$   
no solution



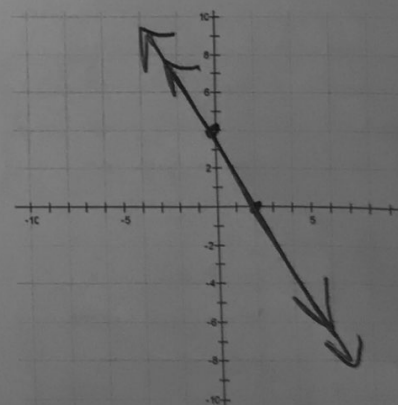
b)  $x + 2y = 0$   
 $x + y = -1$

$2y = -x$   
 $y = -\frac{1}{2}x$   
 $y = -x - 1$   
 $(-2, 1)$



c)  $4x + 2y = 8$   
 $8x + 4y = 16$

$(\text{many solutions})$   
many solutions



4) You are visiting a used book store. The cost of 12 magazines and 7 books is \$5.36. The cost of 8 magazines and 5 books is \$3.68. Find the cost of each.

$$\begin{array}{r} 2(12m + 7b = 5.36) \\ -3(8m + 5b = 3.68) \\ \hline 24m + 14b = 10.72 \\ -24m - 15b = -11.04 \\ \hline -b = -0.32 \\ b = 0.32 \end{array}$$

$$\begin{array}{r} 8m + 5(0.32) = 3.68 \\ 8m + 1.6 = 3.68 \\ 8m = 2.08 \\ m = 0.26 \end{array}$$

$b = \$0.32$   
 $m = \$0.26$

5) JoAnn cashed her paycheck and went to the mall. She has 17 coins in her pocket left. If the total value is \$.61 and she only has pennies and nickels, how many of each coin does she have?

$$\begin{array}{r} -01(p + n = 17) \\ .01p + .05n = .61 \\ + -01p - .01n = -.17 \\ \hline .04n = .44 \\ n = 11 \end{array}$$

$$\begin{array}{r} p + n = 17 \\ p = 6 \end{array}$$

6 pennies  
11 nickels

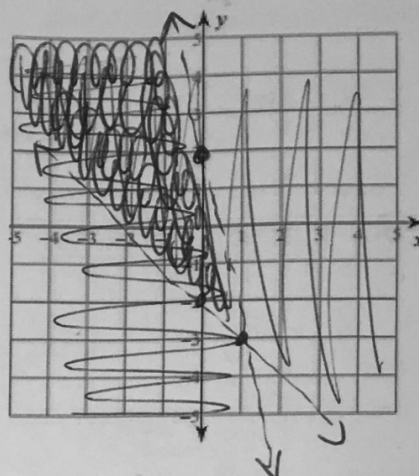
6) The sum of two numbers is 47 and their difference is 9. What are the two numbers?

$$\begin{array}{r} x + y = 47 \\ + x - y = 9 \\ \hline 2x = 56 \\ x = 28 \end{array}$$

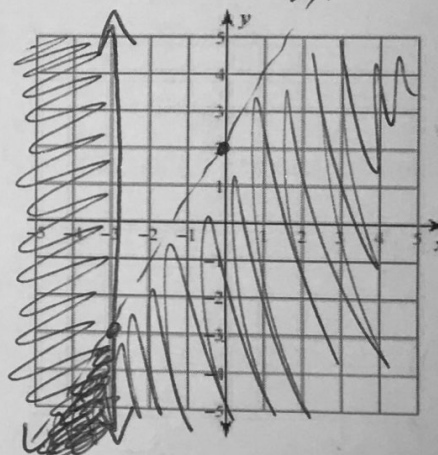
$$\begin{array}{r} 28 + y = 47 \\ y = 19 \end{array}$$

7) Graph the systems of inequalities.

$$\begin{array}{l} y > -x - 2 \quad 0 > -0 - 2 \quad 0 > -2 \quad \checkmark \\ y < -5x + 2 \quad 0 < -5(0) + 2 \quad 0 < 2 \quad \checkmark \end{array}$$



$$\begin{array}{l} x \leq -3 \quad 0 \leq -3 \quad \times \\ y < \frac{5}{3}x + 2 \quad 0 < \frac{5}{3}(0) + 2 \quad 0 < 2 \quad \checkmark \end{array}$$



8)

$$3 \begin{bmatrix} 5 & -6 & 3 \\ 0 & -4 & 8 \\ 10 & -11 & 12 \end{bmatrix} - 2 \begin{bmatrix} 2 & -4 & 0 \\ 5 & 11 & -2 \\ 5 & 0 & -10 \end{bmatrix}$$

$$\begin{bmatrix} 15 & -18 & 9 \\ 0 & -12 & 24 \\ 30 & -33 & 36 \end{bmatrix} + \begin{bmatrix} -4 & 8 & 0 \\ -10 & -22 & 4 \\ -10 & 0 & 20 \end{bmatrix}$$

$$\begin{bmatrix} 11 & -10 & 9 \\ -10 & -34 & 28 \\ 20 & -33 & 56 \end{bmatrix}$$

9)

$$\begin{bmatrix} -2 & 8 \\ -11 & 5 \end{bmatrix} + 3 \begin{bmatrix} 5 & 3 & -11 \\ 44 & 0 & 5 \\ -3 & 2 & 8 \end{bmatrix}$$

not possible

10) Solve the 3 X 3 systems.

①  $3x + y - 2z = 10$

a) ②  $6x - 2y + z = -2$

③  $x + 4y + 3z = 7$

y

①  $(3x + y - 2z = 10)^2$

②  $6x - 2y + z = -2$   
 $+ 6x + 2y - 4z = 20$

$12x - 3z = 18$

②  $(6x - 2y + z = -2)^2$

③  $x + 4y + 3z = 7$   
 $+ 12x - 4y + 2z = -4$

$13x + 5z = 3$

$3(1) + y - 2(-2) = 10$

$3 + y + 4 = 10$

$y + 7 = 10$

$y = 3$

$(1, 3, -2)$

$5(12x - 3z = 18)$

$3(13x + 5z = 3)$

$60x - 15z = 90$   
 $+ 39x + 15z = 9$

$99x = 99$

$x = 1$

$13(1) + 5z = 3$

$13 + 5z = 3$

$5z = -10$

$z = -2$

①  $4x + 4y + z = 24$

b) ②  $2x - 4y + z = 0$

③  $5x - 4y - 5z = 12$

y

①  $4x + 4y + z = 24$

②  $2x - 4y + z = 0$   
 $+$

$6x + 2z = 24$

①  $4x + 4y + z = 24$

③  $5x - 4y - 5z = 12$   
 $+$

$9x - 4z = 36$

$4(4) + 4y + 0 = 24$

$16 + 4y = 24$

$4y = 8$

$y = 2$

$2(6x + 2z = 24)$

$9x - 4z = 36$

$+ 12x + 4z = 48$

$21x = 84$

$x = 4$

$(4, 2, 0)$

$6(4) + 2z = 24$

$24 + 2z = 24$

$2z = 0$

$z = 0$