Solve system: Graphing
Substitution
Addition

Review 1 eqn
(A) CROC, b
(B) 2 points < m, $y-y_1=m(x-x_1)$

Notes 7.3 Systems of Linear Equations in Two Variables

1. Determine whether (-4, 3) is a solution of the system:

$$\begin{cases} x+2y=2 \\ x-2y=6 \end{cases}$$

$-4+2(3) \ ? \ 2$
$-4+6$
$2=2$

$-4-2(3) \ ? \ 6$
$-4-6$
$-10 \neq 6$

No!

2. Solve by graphing: in G.Calc

$$\begin{cases} 2x+3y=6 \\ 2x+y=-2 \end{cases}$$

x	y
0	2
3	0

$\frac{3y_1}{3}=\frac{-2x}{3}+\frac{6}{3}$
$y_2=-2x-2$

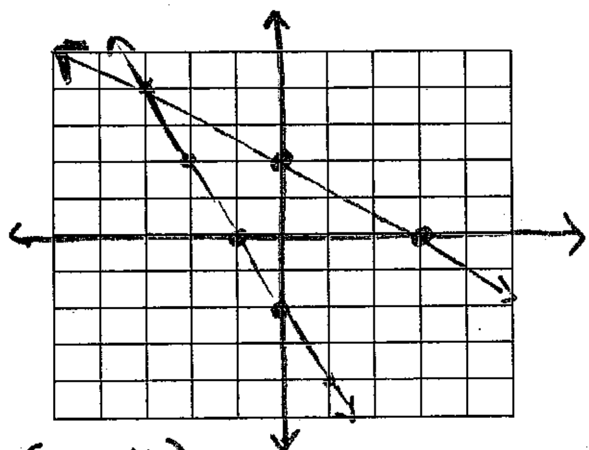
x	y
0	-2
-1	0

← don't need ()

$y_1=\left(-\frac{2}{3}\right)x+2$

$y_2=-2x-2$

2nd trace CALC, intersect



(-3,4)

3. Solve by the substitution method:

$$\begin{cases} y=3x-7 \\ 5x-2y=8 \end{cases}$$

$5x-2(3x-7)=8$
$5x-6x+14=8$
$-1x+14=8$
$-1x=-6$

$x=6$
$y=3\cdot 6-7$
$y=11$

(6,11)

4. Solve by the substitution method:

$$\begin{cases} 3x+2y=-1 \\ x-y=3 \end{cases}$$

$x=y+3$

$3(y+3)+2y=-1$
$3y+9+2y=-1$
$5y+9=-1$
$5y=-10$
$y=-2$

$x+2=3$
$x=1$

(1,-2)

5. Solve by the addition method:

$$\begin{cases} 4x + 5y = 3 \\ 2x - 3y = 7 \end{cases} 2 \longrightarrow \begin{aligned} 4x + 5y &= 3 \\ -4x + 6y &= -14 \end{aligned}$$

$$11y = -11$$

$$y = -1$$

$(2, -1)$

$2x - 3(-1) = 7$

$2x + 3 = 7$

$2x = 4$

$x = 2$

6. Solve by the addition method:

$$\begin{cases} 3x = 2 - 4y \\ 5y = -1 - 2x \end{cases}$$ $Ax + By = C$

$2(3x + 4y = 2) \rightarrow 6x + 8y = 4$

$-3(2x + 5y = -1) \quad -6x - 15y = 3$

$-7y = 7$

$y = -1$

$3x = 2 - 4(-1)$

$2 + 4$

$3x = 6$

$x = 2$

$(2, -1)$

7. Solve the system:

$$-3\begin{cases} (x + 2y = 4) \\ 3x + 6y = 13 \end{cases} \longrightarrow \begin{aligned} -3x - 6y &= -12 \\ 3x + 6y &= 13 \end{aligned}$$

$0 = 1$

$\neq$

No solution.

Set Notation $\rightarrow$ $\boxed{\phi}$

8. Solve the system:

$$\begin{cases} y = 4x - 4 \\ 8x - 2y = 8 \end{cases}$$

Same line coinciding

$8x - 2(4x - 4) = 8$

$\cancel{8x} - \cancel{8x} + 8 = 8$

$8 = 8$

Infinitely many solns. But not $\mathbb{R}$

$$\boxed{\{(x, y) \mid y = 4x - 4\} \text{ or } \{(x, y) \mid 8x - 2y = 8\}}$$

STOP

9. Finding a Break-Even Point

A company that manufactures running shoes has a fixed cost of $300,000. Additionally, it costs $30 to produce each pair of shoes. They are sold at $80 per pair.

for manufacturer

a. Write the cost function, C, of producing x pairs of running shoes.

Profit = R(x) - C(x)

$$C(x) = 300{,}000 + 30x$$

b. Write the revenue function, R, from the sale of x pairs of running shoes.

$$R(x) = 80x$$

Revenue - Cost = ?

c. Determine the break-even point. Describe what this means.

$$C(x) = 300\,000 + 30x$$

$$R(x) = 80x$$

$$300\,000 + 30x = 80x$$

$$300\,000 = 50x$$

$$6000 = x$$

$$R(6000) = 80(6000)$$

$$= 480{,}000$$

$$(6000, 480{,}000)$$

When 6000 shoes are produced and sold both revenue & cost are $480,000

The company will break even if it produces and sells 6000 pairs of running shoes.

More than 6000 pairs of shoes will mean the company is making $.