

# Linear Systems

What is it?

2 lines, find the P.O.I.

How to Solve?

- Graph
- Substitution
- Elimination

Graphing

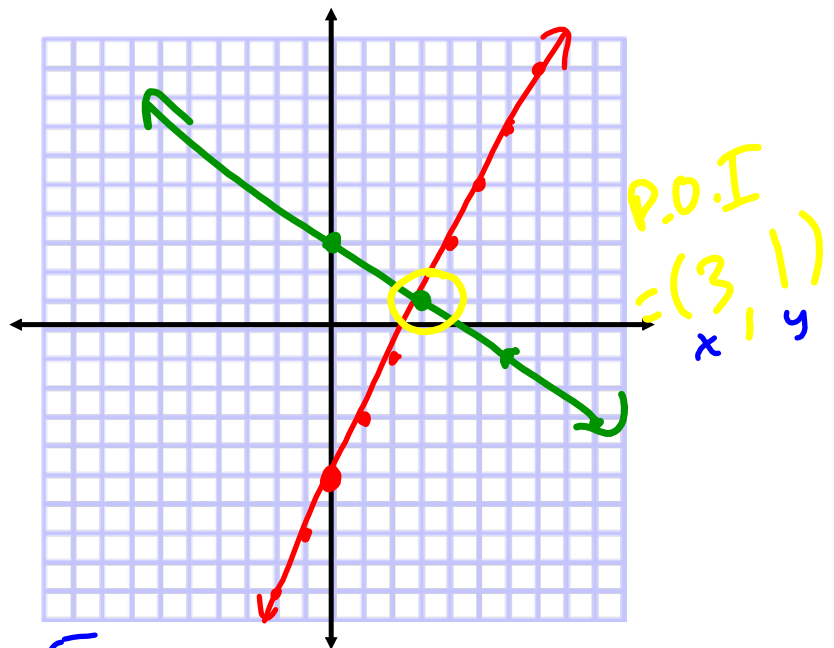
$$y = \overset{m}{2}x - \overset{b}{5}$$

$$y = -\frac{2}{3}x + 3$$



$$y = 2x - 5$$

$$1 \quad 2(3) - 5$$
$$6 - 5$$
$$1$$



Substitution

$$2x + 3y = -9$$

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

$$2(3 + y) + 3y = -9$$

$$6 + 2y + 3y = -9 \rightarrow -6$$

$$\frac{5y}{5} = \frac{-15}{5}$$

$$y = -3$$

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

Elimination

$$\begin{array}{l} (4x + 4y = 5) \times 3 \\ 2 \times (3x - 2y = -2) \times 4 \end{array}$$

$$\begin{array}{r} 4x + 4y = 5 \\ + 6x - 4y = -4 \\ \hline 10x \qquad = \frac{1}{10} \end{array}$$

$$x = \frac{1}{10}$$
$$x = 0.1$$

$$\begin{array}{r} 12x + 12y = 15 \\ - 12x - 8y = -8 \\ \hline 0x + \frac{20y}{20} = \frac{23}{20} \\ y = \frac{23}{20} \end{array}$$

The difference of two numbers is 3. Their sum is 13. Determine the two numbers.

Let  $x$  rep. the first #  
"  $y$  " " second #

$$\begin{array}{r} x - y = 3 \\ + x + y = 13 \\ \hline \end{array}$$

$$\frac{2x}{2} \quad 0 = \frac{16}{2}$$

$$x = 8$$

The school that Stefan goes to is selling tickets to a choral performance. On the first day of ticket sales the school sold 3 senior citizen tickets and 1 child ticket for a total of \$38. The school took in \$52 on the second day by selling 3 senior citizen tickets and 2 child tickets. Find the price of a senior citizen ticket and the price of a child ticket.

Let  $s$  rep. # of senior ticket sold  
 "  $c$  " " " child " "

$$\begin{array}{r}
 3s + 1c = 38 \\
 - 3s + 2c = 52 \\
 \hline
 -1c = -14 \\
 c = 14
 \end{array}$$

$$\begin{array}{r}
 3s + 14 = 38 + 4 \\
 \underline{3s = 24} \\
 3 \quad 3 \\
 s = 8
 \end{array}$$

You have two solutions of hydrogen peroxide. One is a 3% solution and the other is a 10% solution. How much of each solution will you need to create 10L of a 7% hydrogen peroxide solution?

Let  $x$  rep. the amount of 3% sol  
 "  $y$  " " " " " 10% "

$$(x + y = 10) \times 10$$

$$3x + 10y = \underline{\underline{7(10)}}$$

$$\begin{array}{r} 10x + 10y = 100 \\ - 3x + 10y = 70 \\ \hline 7x = 30 \\ \hline x = \frac{30}{7} \end{array}$$

$$x = \frac{30}{7}$$

$$x = 4.29$$

$$\begin{array}{r} x + y = 10 \\ 4.29 + y = 10 - 4.29 \\ y = 5.71 \end{array}$$

$\therefore$  you need 4.29L of 3%  
 and 5.71L of 10% solutions.