Section 4.3 Solving Systems by Addition

3 ways to solve linear systems

1. graphing 4.1
2. Substitution 4.2
3. Addition 4.3

Ex: 2.
$$\begin{cases} x + \cancel{y} = 6 \\ x - \cancel{y} = -2 \end{cases}$$
$$+$$
$$\frac{2x}{2} = \frac{4}{2}$$
$$x = 2$$

Substitution

$$2 + y = 6$$
$$-2 \qquad -2$$
$$y = 4$$

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

4.
$$\begin{cases} 3x + \cancel{2y} = 14 \\ 3x - \cancel{2y} = 10 \end{cases}$$
$$+$$
$$\frac{6x}{6} = \frac{24}{6}$$
$$x = 4$$

$$3(4) + 2y = 14$$
$$12 + 2y = 14$$
$$-12 \qquad -12$$
$$\frac{2y}{2} = \frac{2}{2}$$
$$y = 1$$

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

10.
$$\begin{cases} 3x - 1y = 11 \\ 2x + 5y = 13 \end{cases}$$
$$\rightarrow 5(3x - y) = (11) \cdot 5$$

multiply the 1st equation by 5

$$15x - \cancel{5y} = 55$$
$$+\ 2x + \cancel{5y} = 13$$
$$\frac{17x}{17} = \frac{68}{17}$$
$$x = 4$$

$$3x - y = 11$$
$$3(4) - y = 11$$
$$12 - y = 11$$
$$-12 \qquad -12$$
$$\frac{-y}{-1} = \frac{-1}{-1}$$
$$y = 1$$

16. $\begin{cases} 5x-4y=19 \\ 3x+2y=7 \end{cases}$ $\rightarrow 2(3x+2y=7)$

$6x+4y=14$

$$\begin{array}{r} 5x-\cancel{4y}=19 \\ +\ 6x+\cancel{4y}=14 \\ \hline 11x \quad =33 \\ x \quad =3 \end{array}$$

$3x+2y=7$

$3(3)+2y=7$

$9 \quad +2y=7$

$-9 \qquad\quad -9$

$\frac{2y}{2}=\frac{-2}{2}$

$y=-1$

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

18. $\begin{cases} 10(2x+3y=-16) \\ 3(5x-10y=30) \end{cases}$

make equal but opposite coefficients for x or y

$$\begin{array}{r} 20x+\cancel{30y}=-160 \\ +\ 15x-\cancel{30y}=\quad 90 \\ \hline \frac{35x}{35} \quad =\frac{-70}{35} \end{array}$$

$x=-2$

$2x+3y=-16$

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

$-4 \quad +3y=-16$

$+4 \qquad\quad +4$

$\frac{3y}{3}=\frac{-12}{3}$

$y=-4$

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

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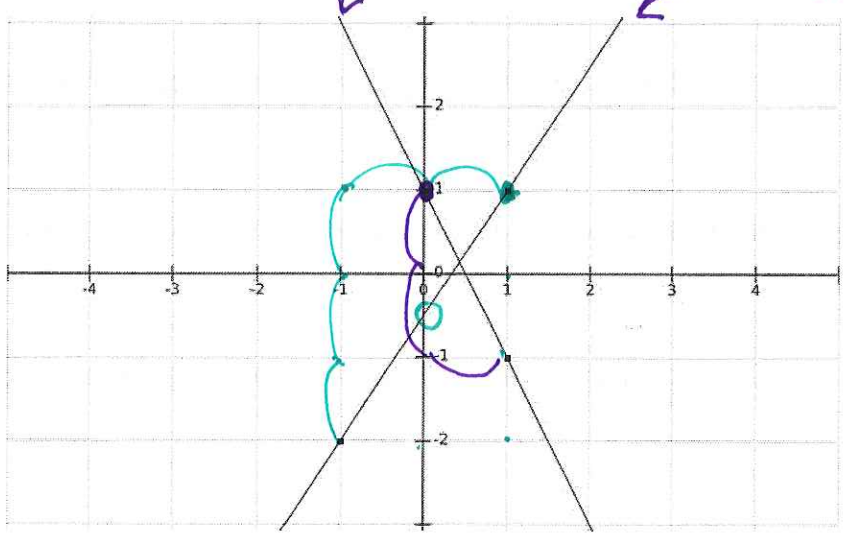
Supplement to §4.3

The graph below shows a system of linear equations. However, the exact solution cannot be determined from the graph. Find the equations of the lines and solve the system algebraically and verify that your result makes sense for the graph.

Example:

$y = -2x + 1$ $m = \frac{3}{2}$



$\frac{+3}{+2}$ $\frac{-3}{-2}$

x_1, y_1

$m = \frac{3}{2}$ $(1, 1)$

$y - y_1 = m(x - x_1)$

$y - 1 = \frac{3}{2}(x - 1)$

$y - 1 = \frac{3}{2}x - \frac{3}{2}$

$+1 \qquad +1 \quad \frac{2}{2}$

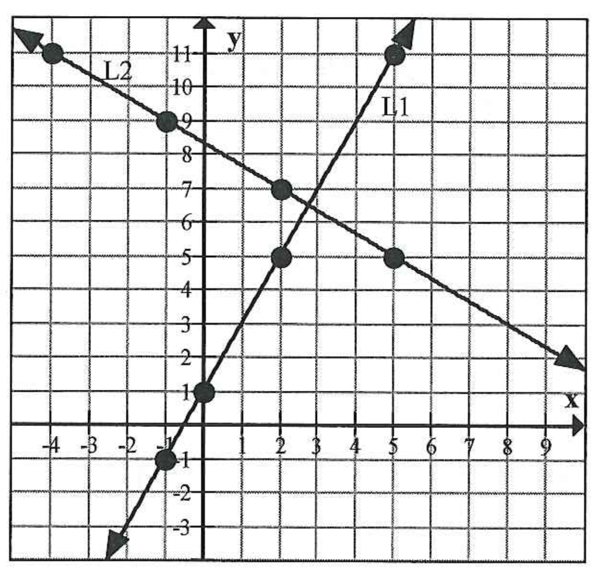
$y = \frac{3}{2}x - \frac{1}{2}$

solve using substitution

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

Try this one:

1.)



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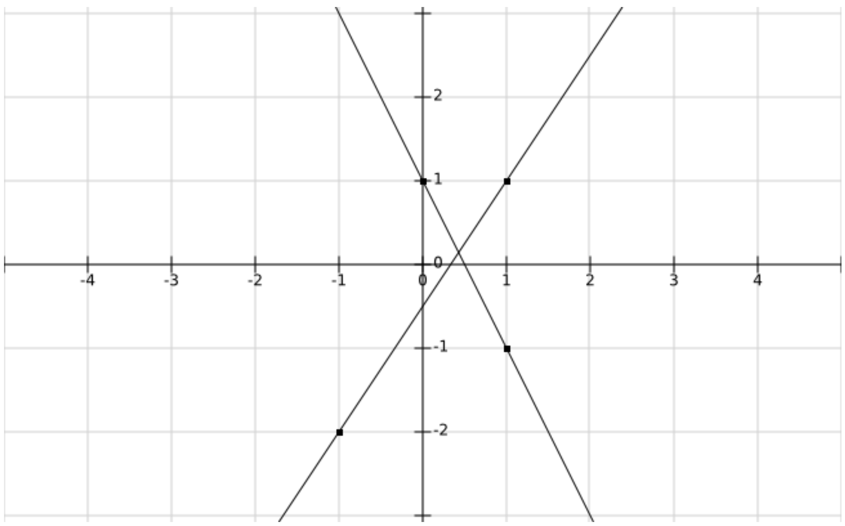

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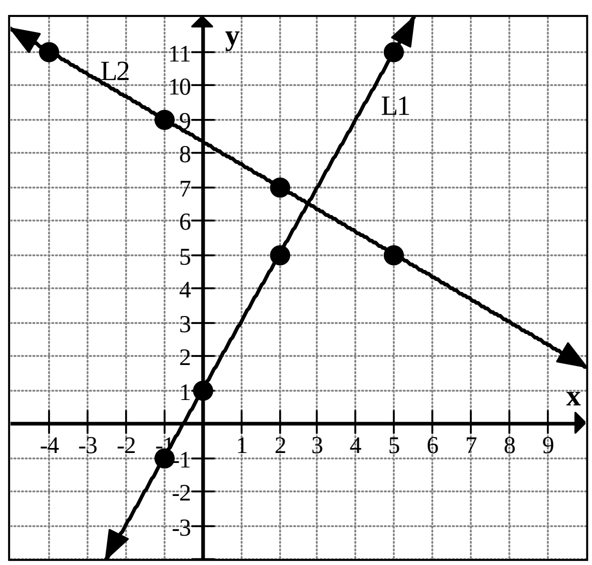

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Mth 65 Supplement Key

§4.3

1.) The simplified system is $\begin{cases} y = 2x+1 \\ y = -\frac{2}{3}x + \frac{25}{3} \end{cases}$ The solution to the system is $\left(\frac{11}{4}, \frac{13}{2}\right)$.

§4.4

1.)a.) No, it's not possible. The cheapest mix he could possibly make is made entirely of pineapple and would cost $3.99 per pound. Even if you add a tiny amount of mango, it would raise the price.

b.) The cost of $4.80 per pound is closer to $3.99 than $5.99. This means that more of the pineapple was added than mango.

c.) He added 5 pounds of mango and no pineapple at all.

d.) The cost of $5.00 per pound is closer to $5.99 than $3.99. This means he added more mango than pineapple.

2.) Dimensional Analysis practice.

a.) $36\min \cdot \frac{1hr}{60\min} = \frac{36}{60}hr = 0.6hr$ b.) $54\min \cdot \frac{1hr}{60\min} = \frac{54}{60}hr = \frac{9}{10}hr$

c.) $4hr \cdot \frac{60\min}{1hr} = 240\min$. So, 4hr20min is 260min.

d.) $0.2hr \cdot \frac{60\min}{1hr} = 12\min$. So 4.20hr is 4hr12min.

e.) $248cm \cdot \frac{1in}{2.54cm} \cdot \frac{1ft}{12in} \approx 8.136ft$ f.) $4ft^2 \cdot \frac{12in}{1ft} \cdot \frac{12in}{1ft} = 576in^2$

g.) $343in^2 \cdot \frac{1ft}{12in} \cdot \frac{1ft}{12in} \approx 2.382ft^2$