7.3 Solving Linear Systems by Linear Combinations

$$\begin{array}{r} 35 \\ +14 \\ \hline 49 \end{array}$$

The Concept

Multiply $\xrightarrow{\text{then}}$ Add

(to get a opposite)   (for 1 Variable)

$$4x + 3y = 16$$
$$+ \quad 2x - 3y = 8$$
$$6x + 0 = 24$$
$$6x = 24$$
$$\frac{6x}{6} = \frac{24}{6}$$

$$\boxed{x = 4}$$

$$2(4) - 3y = 8$$
$$8 - 3y = 8$$
$$\underline{-8 \qquad -8}$$
$$-3y = 0$$
$$\frac{-3y}{-3} = \frac{0}{-3}$$

$$\boxed{y = 0}$$

So... the Solution is: $(4, 0)$

ex2)

$$2(-x + y = 1) \rightarrow -2x + 2y = 2$$
$$2x + y = -2 \rightarrow +2x + y = -2$$

$$\frac{3y}{3} = \frac{0}{3}$$

$$\boxed{y = 0}$$

$$2x + (0) = -2$$
$$\frac{2x}{2} = \frac{-2}{2}$$
$$\boxed{x = -1}$$

So... the Solution is: $\underline{(-1, 0)}$

ex3)

$$4(3x + 5y = 6) \rightarrow 12x + 20y = 24$$
$$3(-4x + 2y = 5) \rightarrow +\ -12x + 6y = 15$$

$$\frac{26y}{26} = \frac{39}{26}$$

$$y = \frac{39}{26}$$

$$\boxed{y = \frac{3}{2}}$$

$$-4x + 2\left(\frac{3}{2}\right) = 5$$
$$-4x + 3 = 5$$
$$\ -3\ \ -3$$
$$\frac{-4x = 2}{-4 \quad -4}$$
$$\boxed{x = -\frac{1}{2}}$$

the Solution is: $\left(-\frac{1}{2}, \frac{3}{2}\right)$

<u>Check</u>

$$3x + 5y = 6 \qquad\qquad -4x + 2y = 5$$
$$3\left(-\frac{1}{2}\right) + 5\left(\frac{3}{2}\right) \overset{?}{=} 6 \qquad -4\left(-\frac{1}{2}\right) + 2\left(\frac{3}{2}\right) \overset{?}{=} 5$$
$$-\frac{3}{2} + \frac{15}{2} \overset{?}{=} 6 \qquad\qquad 2 + 3 \overset{?}{=} 5 \checkmark$$
$$\frac{12}{2} \overset{?}{=} 6 \qquad\qquad\qquad 5 = 5 \checkmark$$
$$6 = 6 \checkmark$$

ex4

$-1 (3x + 2y = 8) \rightarrow -3x - 2y = -8$

$2y = 12 - 5x \qquad +5x + 2y = 12$

$+5x \qquad\qquad +5x \qquad\qquad \dfrac{2x}{2} = \dfrac{4}{2}$

$5x + 2y = 12 \qquad\qquad \boxed{x = 2}$

$5(2) + 2y = 12$

$10 + 2y = 12$

$-10 \qquad\quad -10$

$\dfrac{2y = 2}{2 \quad 2}$

$y = 1$

So... the Solution is: $(2,1)$

O.T.L.

① Pg 405: 7-13(o);
14-22(e);
23-29(o)

Show All Work