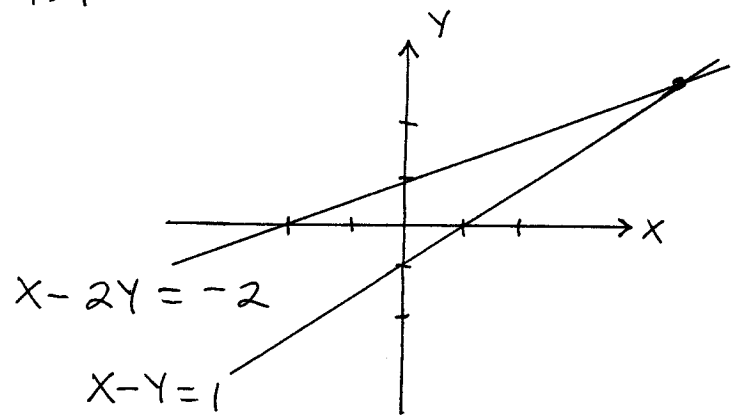


Section 9.1

$$1.) \begin{cases} X - Y = 1 \\ X - 2Y = -2 \end{cases} \rightarrow$$

$$-Y = -3 \rightarrow$$

$$Y = 3, X = 4$$



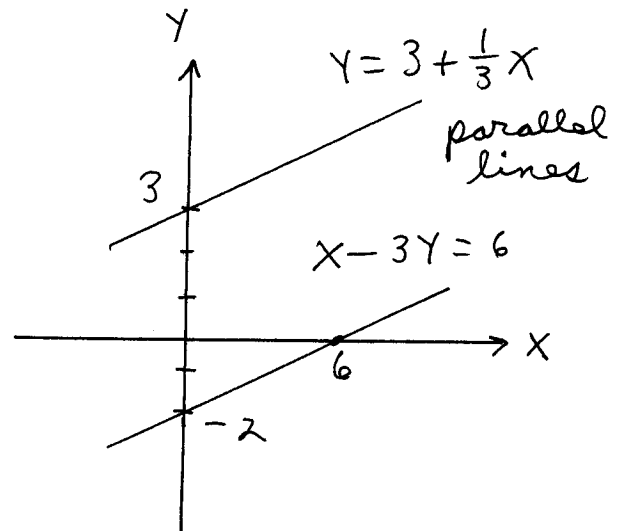
$$3.) \begin{cases} X - 3Y = 6 \\ Y = 3 + \frac{1}{3}X \end{cases} \rightarrow$$

$$X - 3(3 + \frac{1}{3}X) = 6 \rightarrow$$

$$X - 9 - X = 6 \rightarrow$$

$$-9 = 6 \quad (?! \star)$$

(NO SOLUTION)



$$4.) \begin{cases} 2X + Y = \frac{1}{3} \\ 6X + 3Y = 1 \end{cases} \rightarrow$$

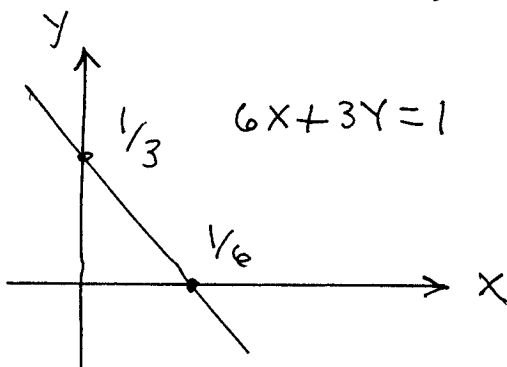
$$\begin{cases} Y = \frac{1}{3} - 2X \\ 6X + 3Y = 1 \end{cases} \rightarrow$$

$$6X + 3(\frac{1}{3} - 2X) = 1 \rightarrow$$

$$6X + 1 - 6X = 1 \rightarrow$$

$$1 = 1$$

(redundant)



$2X + Y = \frac{1}{3} \rightarrow 6X + 3Y = 1$
and $6X + 3Y = 1$;
let $X = t$ any real
#, then

$$6X + 3Y = 1 \rightarrow$$

$$3Y = 1 - 6X \rightarrow$$

$$Y = \frac{1}{3} - 2X \rightarrow$$

$$Y = \frac{1}{3} - 2t$$

(*oo many solutions*)

17.) x : # of fish, y : # of plants

$$x + y = 11$$

$$2.3x + 1.7y = 21.7 \quad \left. \vphantom{\begin{matrix} x + y = 11 \\ 2.3x + 1.7y = 21.7 \end{matrix}} \right\} \rightarrow y = 11 - x \rightarrow \text{(sub)}$$

$$\rightarrow 2.3x + 1.7(11 - x) = 21.7$$

$$\rightarrow 2.3x + 18.7 - 1.7x = 21.7$$

$$\rightarrow 0.6x = 3 \rightarrow x = 3 \div \frac{6}{10} = 3 \cdot \frac{10}{6} \rightarrow$$

$$\boxed{x=5, y=6}$$

18.) a.) Food 1

$$\begin{array}{cc} \text{1 oz.} & \\ \hline A & B \\ \hline 3 & 2 \end{array}$$

Food 2

$$\begin{array}{cc} \text{1 oz.} & \\ \hline A & B \\ \hline 4 & 5 \end{array}$$

x : ozs. of 1,
 y : ozs. of 2

$$\left. \begin{array}{l} \text{units of A: } 3x + 4y \\ \text{units of B: } 2x + 5y \end{array} \right\} \text{ SET EQUAL } \rightarrow$$

$$3x + 4y = 2x + 5y \rightarrow \boxed{x=y}$$

$$21.) \left. \begin{array}{l} x + 2y - z = -1 \\ 5x - y + 2z = 6 \\ 3x + 2y - 2z = 1 \end{array} \right\} \rightarrow \left. \begin{array}{l} -11y + 7z = 11 \\ -4y + z = 4 \end{array} \right\} \rightarrow$$

$$z = 4 + 4y \rightarrow \text{(sub)}$$

$$-11y + 7(4 + 4y) = 11 \rightarrow$$

$$-11y + 28 + 28y = 11 \rightarrow 17y = -17 \rightarrow$$

$$\boxed{y=-1}, \quad \boxed{z=0}, \quad \boxed{x=1}$$

$$23.) \left. \begin{array}{l} x + 7y + 2z = -4 \\ -2x + 4y - z = -1 \\ 3x - 2y + 3z = -3 \end{array} \right\} \rightarrow \left. \begin{array}{l} 18y + 3z = -9 \\ -23y - 3z = 9 \end{array} \right\} (+)$$

$$\rightarrow -5Y = 0 \rightarrow Y=0, Z=-3, X=2$$

$$25.) \begin{array}{c} x \quad y \quad z \\ \left[\begin{array}{ccc|c} -1 & -2 & 3 & -9 \\ 2 & 1 & -1 & 5 \\ 4 & -3 & 5 & -9 \end{array} \right] \sim \left[\begin{array}{ccc|c} -1 & -2 & 3 & -9 \\ 0 & -3 & 5 & -13 \\ 0 & -11 & 17 & -45 \end{array} \right]$$

$$\sim \left[\begin{array}{ccc|c} 1 & 2 & -3 & 9 \\ 0 & 1 & -5/3 & 13/3 \\ 0 & -11 & 17 & -45 \end{array} \right] \sim \left[\begin{array}{ccc|c} 1 & 0 & 1/3 & 1/3 \\ 0 & 1 & -5/3 & 13/3 \\ 0 & 0 & -4/3 & 8/3 \end{array} \right]$$

$$\sim \left[\begin{array}{ccc|c} 1 & 0 & 1/3 & 1/3 \\ 0 & 1 & -5/3 & 13/3 \\ 0 & 0 & 1 & -2 \end{array} \right] \sim \begin{array}{c} x \quad y \quad z \\ \left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & -2 \end{array} \right] \rightarrow$$

$$X=1, Y=1, Z=-2$$

$$27.) \begin{array}{c} x \quad y \quad z \\ \left[\begin{array}{ccc|c} 1 & 1 & 0 & 3 \\ 0 & -1 & 1 & -1 \\ 1 & 0 & 1 & 2 \end{array} \right] \sim \left[\begin{array}{ccc|c} 1 & 1 & 0 & 3 \\ 0 & -1 & 1 & -1 \\ 0 & -1 & 1 & -1 \end{array} \right] \sim \left[\begin{array}{ccc|c} 1 & 1 & 0 & 3 \\ 0 & -1 & 1 & -1 \\ 0 & 0 & 0 & 0 \end{array} \right]$$

$$\sim \left[\begin{array}{ccc|c} 1 & 1 & 0 & 3 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & 0 & 0 \end{array} \right] \sim \begin{array}{c} x \quad y \quad z \\ \left[\begin{array}{ccc|c} 1 & 0 & 1 & 2 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & 0 & 0 \end{array} \right] \rightarrow Y-Z=1 \rightarrow \\ Y=Z+1;$$

let $z=t$ any real #, $Y=t+1$, and
 $X+Z=2 \rightarrow X=2-Z \rightarrow X=2-t$.

$$28.) \left. \begin{array}{l} 2x - z = 1 \\ -x + y + 3z = -1 \\ x - y + z = -3 \end{array} \right\} \rightarrow \left. \begin{array}{l} x - y + z = -3 \\ -x + y + 3z = -1 \\ 2x - z = 1 \end{array} \right\} \rightarrow$$

$$\begin{array}{c} x \quad y \quad z \\ \left[\begin{array}{ccc|c} 1 & -1 & 1 & -3 \\ -1 & 1 & 3 & -1 \\ 2 & 0 & -1 & 1 \end{array} \right] \sim \left[\begin{array}{ccc|c} 1 & -1 & 1 & -3 \\ 0 & 0 & 4 & -4 \\ 0 & 2 & -3 & 7 \end{array} \right] \sim \left[\begin{array}{ccc|c} 1 & -1 & 1 & -3 \\ 0 & 0 & 1 & -1 \\ 0 & 2 & -3 & 7 \end{array} \right] \end{array}$$

$$\sim \left[\begin{array}{ccc|c} 1 & -1 & 0 & -2 \\ 0 & 0 & 1 & -1 \\ 0 & 2 & 0 & 4 \end{array} \right] \sim \left[\begin{array}{ccc|c} 1 & -1 & 0 & -2 \\ 0 & 0 & 1 & -1 \\ 0 & 1 & 0 & 2 \end{array} \right] \sim \left[\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & -1 \\ 0 & 1 & 0 & 2 \end{array} \right] \rightarrow$$

$$\boxed{x=0}, \quad \boxed{y=2}, \quad \boxed{z=-1}$$

$$35.) \begin{array}{l} x: \text{g. of SL } 24-4-8 \\ y: \text{g. of SL } 21-7-12 \\ z: \text{g. of SL } 17-0-0 \end{array} \begin{array}{l}) \\) \\) \end{array}$$

$$\begin{array}{ccc} \uparrow & \uparrow & \uparrow \\ N_i & Ph & P_o \end{array} \quad \text{90's}$$

$$\left. \begin{array}{l} N_i: 0.24x + 0.21y + 0.17z = 500 \text{ g.} \\ Ph: 0.04x + 0.07y + 0.00z = 100 \text{ g.} \\ P_o: 0.08x + 0.12y + 0.00z = 180 \text{ g.} \end{array} \right\} \rightarrow$$

$$\left. \begin{array}{l} 24x + 21y + 17z = 50,000 \\ 4x + 7y = 10,000 \\ 8x + 12y = 18,000 \end{array} \right\} \rightarrow \left. \begin{array}{l} -8x - 14y = -20,000 \\ 8x + 12y = 18,000 \end{array} \right\}$$

$$\rightarrow -2Y = -2000 \rightarrow Y = 1000 \text{ g.} \rightarrow$$

$$8X = 6000 \rightarrow X = 750 \text{ g.} \rightarrow$$

$$18,000 + 21,000 + 17Z = 50,000 \rightarrow$$

$$17Z = 11,000 \rightarrow Z = \frac{11,000}{17} \approx 647.1 \text{ g.}$$