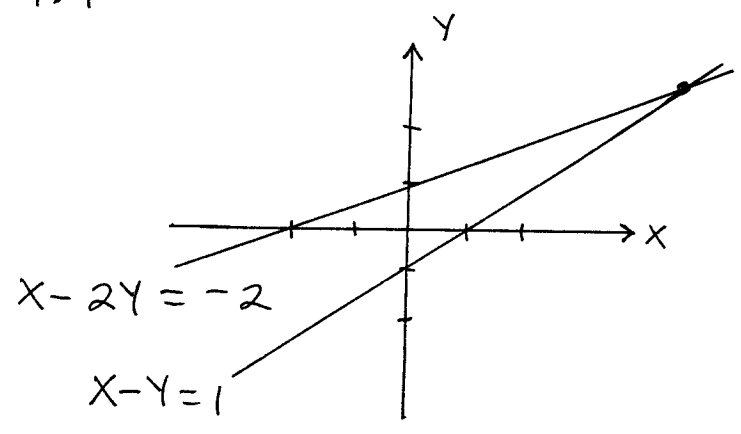
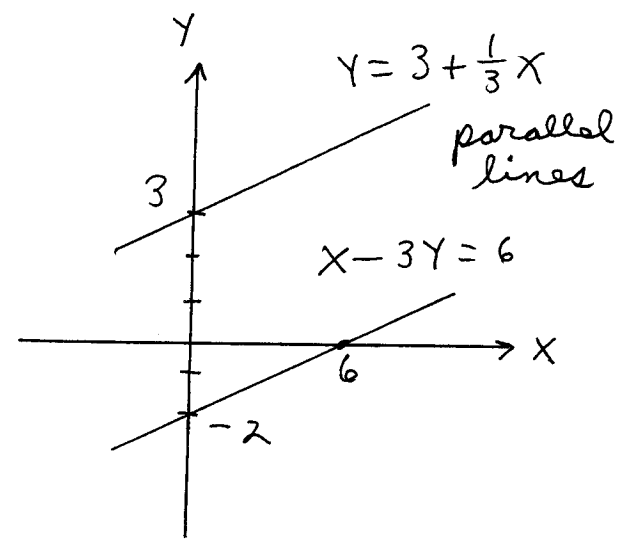


Section 9.1

$$\begin{aligned}
 1.) \quad & \left. \begin{aligned} X - Y &= 1 \\ X - 2Y &= -2 \end{aligned} \right\} \rightarrow \\
 & -Y = -3 \rightarrow \\
 & \boxed{Y = 3, X = 4}
 \end{aligned}$$

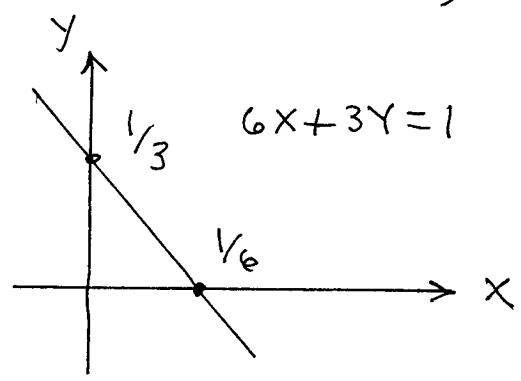


$$\begin{aligned}
 3.) \quad & \left. \begin{aligned} X - 3Y &= 6 \\ Y &= 3 + \frac{1}{3}X \end{aligned} \right\} \rightarrow \\
 & X - 3\left(3 + \frac{1}{3}X\right) = 6 \rightarrow \\
 & X - 9 - X = 6 \rightarrow \\
 & -9 = 6 \quad (?! \star) \\
 & \underline{\underline{\text{NO SOLUTION}}}
 \end{aligned}$$



$$\begin{aligned}
 4.) \quad & \left. \begin{aligned} 2X + Y &= \frac{1}{3} \\ 6X + 3Y &= 1 \end{aligned} \right\} \rightarrow \\
 & \left. \begin{aligned} Y &= \frac{1}{3} - 2X \\ 6X + 3Y &= 1 \end{aligned} \right\} \rightarrow \\
 & 6X + 3\left(\frac{1}{3} - 2X\right) = 1 \rightarrow \\
 & 6X + 1 - 6X = 1 \rightarrow \\
 & 1 = 1 \\
 & \text{(redundant)}
 \end{aligned}$$

$$\begin{aligned}
 & 2X + Y = \frac{1}{3} \rightarrow 6X + 3Y = 1 \\
 & \text{and } 6X + 3Y = 1; \\
 & \text{let } \boxed{X = t} \text{ any real} \\
 & \# , \text{ then} \\
 & 6X + 3Y = 1 \rightarrow \\
 & 3Y = 1 - 6X \rightarrow \\
 & Y = \frac{1}{3} - 2X \rightarrow \\
 & \boxed{Y = \frac{1}{3} - 2t} \\
 & \text{(as many solutions)}
 \end{aligned}$$



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

$$x + y = 11$$

$$2.3x + 1.7y = 21.7$$

$$\left. \begin{array}{l} x + y = 11 \\ 2.3x + 1.7y = 21.7 \end{array} \right\} \rightarrow y = 11 - x \rightarrow \text{(SUB)}$$

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

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

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

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

18.) a.) Food 1

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

Food 2

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

$$\boxed{\begin{array}{l} x: \text{ozs. of 1,} \\ y: \text{ozs. of 2} \end{array}}$$

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

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

b.) If units A : units B is 1:2, then
(units of B) = 2 (units of A) \rightarrow

$$2x + 5y = 2(3x + 4y) \rightarrow$$

$$2x + 5y = 6x + 8y \rightarrow 0 = 4x + 3y \rightarrow$$

$$y = -\frac{4}{3}x \text{ (impossible) so NO SOLUTION}$$

c.) If units A : units B is 5:6, then

$$5 (\text{units of B}) = 6 (\text{units of A}) \rightarrow$$

$$5(2X + 5Y) = 6(3X + 4Y) \rightarrow$$

$$10X + 25Y = 18X + 24Y \rightarrow$$

$$\boxed{Y = 8X}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$35.) \begin{array}{l} x: \text{g. of SL } 24-4-8 \\ y: \text{g. of SL } 21-7-12 \\ z: \text{g. of SL } 17-0-0 \end{array} \left. \begin{array}{l} \uparrow \quad \uparrow \quad \uparrow \\ N_i \quad Ph \quad P_o \quad \text{g}_o\text{'s} \end{array} \right\}$$

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

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

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

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

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

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