

Reynolds Beverage Company

(1)

a)

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

$$D = \begin{vmatrix} 2 & -1 \\ -1 & 3 \end{vmatrix} = 6 - 1 = 5,$$

$$D_x = \begin{vmatrix} 2 & -1 \\ -3 & 3 \end{vmatrix} = 6$$

$$D_y = \begin{vmatrix} 2 & -1 \\ -1 & 3 \end{vmatrix} = -6$$

$$D_x = 6 - 3$$

$$D_x = 3$$

$$D_y = -6 - (-2)$$

$$D_y = -4$$

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$$x = \frac{3}{5}$$

$$y = \frac{-4}{5}$$

b)

$$\begin{cases} 3x - y + z = 1 \\ 2x + 3z = -1 \\ 4x + y - 2z = 7 \end{cases}$$

$$D = \left| \begin{array}{ccc|c} 3 & -1 & 1 & 10 \\ 2 & 0 & 3 & 4 \\ 4 & 1 & -2 & 13 \\ \hline 3 & -1 & 1 & 0 \\ 2 & 0 & 3 & 12 \\ \hline & & & 10 \end{array} \right| \quad \left. \begin{array}{l} D = 10 - 13 \\ D = -23 \end{array} \right\}$$

$$D_x = \left| \begin{array}{ccc|c} 1 & -1 & 1 & 10 \\ -1 & 0 & 3 & -2 \\ 3 & 1 & -2 & 1 \\ \hline 1 & -1 & 1 & 0 \\ -1 & 0 & 3 & -1 \\ \hline & & & -22 \end{array} \right| \quad \left. \begin{array}{l} D_x = -22 - 1 \\ D_x = -23 \end{array} \right.$$

$$D_y = \left| \begin{array}{ccc|c} 3 & 1 & 1 & -4 \\ 2 & -1 & 3 & 63 \\ 4 & 7 & -2 & 55 \\ \hline 3 & 1 & 1 & 6 \\ 2 & -1 & 3 & 14 \\ \hline & & & 32 \end{array} \right| \quad \left. \begin{array}{l} D_y = 32 - 55 \\ D_y = -23 \end{array} \right.$$

$$D_z = \left| \begin{array}{ccc|c} 3 & -1 & 1 & 10 \\ 2 & 0 & -1 & -14 \\ 4 & 1 & 7 & -17 \\ \hline 3 & -1 & 1 & 0 \\ 2 & 0 & -1 & 2 \\ \hline & & & 10 \end{array} \right| \quad \left. \begin{array}{l} D_z = 6 - \\ D_z = 23 \end{array} \right.$$

$$x = \frac{-23}{-23} = 1$$

$$x = -23$$

$$y = \frac{-23}{-23} = 1$$

$$y = \frac{-23}{-23} = 1$$

$$z = \frac{23}{-23} = -1$$

(2)

$$\begin{array}{l} \text{I} \\ \text{II} \\ \text{III} \end{array} \left\{ \begin{array}{l} 3x + 4y - z = 1 \\ 4x + 5y + 2z = 12 \\ 4x - 2y + 3z = 8 \end{array} \right.$$

$$\left. \begin{array}{l} (\text{I}) \quad 3x + 4y - z = 1 \\ (\text{III}) \quad \underline{x - 2y + 3z = 8} \quad \oplus \\ - \quad \underline{\quad 4x + 2y + 2z = 9} \quad (\text{IV}) \end{array} \right. \quad - \quad - \quad -$$

$$(\text{II}) \quad 4x + 5y + 2z = 12 \quad (-1)$$

$$\begin{array}{r} -4x - 5y - 2z = -12 \quad \oplus \\ \hline (\text{IV}) \quad 4x + 2y - 2z = 9 \quad \oplus \\ \hline -3y = -3 \end{array}$$

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

$y = 1$

(3)

$$\begin{cases} x + 2y + z = 1 \\ 3x + y - 11z = -2 \\ 2x + 3y - z = 1 \end{cases}$$

$$D_x = \begin{vmatrix} 1 & 2 & 1 & 1 \\ -2 & 1 & -11 & -33 \\ 1 & 3 & -4 & -28 \\ 1 & 2 & 1 & -1 \\ -2 & 1 & -11 & -6 \\ \hline & & & -22 \\ & & & -29 \end{vmatrix}$$

$$D_x = -29 - (-28)$$

$$D_x = -1$$

$$D = \begin{vmatrix} 1 & 2 & 1 & 2 \\ 3 & 1 & -11 & -33 \\ 2 & 3 & -1 & -6 \\ 1 & 2 & 1 & -1 \\ 3 & 1 & -11 & -34 \\ \hline & & & -1 \\ & & & 9 \\ & & & -44 \\ & & & -36 \end{vmatrix}$$

$$\left. \begin{array}{l} D = -36 \\ D = 1 \end{array} \right\}$$

$$D_y =$$

$$D_y = \begin{vmatrix} 1 & 1 & 1 & -4 \\ 3 & -2 & -11 & -11 \\ 2 & 1 & -1 & -3 \\ 1 & 1 & 1 & 2 \\ 3 & -2 & -11 & 3 \\ \hline & & & -22 \\ & & & 17 \end{vmatrix}$$

$$D_y = 17 - (-18)$$

$$D_y = 1$$

$$D_z =$$

$$D_z = \begin{vmatrix} 1 & 2 & 1 & 2 \\ 3 & 1 & -2 & -6 \\ 2 & 3 & 1 & 6 \\ 1 & 2 & 1 & 1 \\ 3 & 1 & -2 & 3 \\ \hline & & & -9 \\ & & & 2 \end{vmatrix}$$

$$D_z = 2 - 2$$

$$D_z = 0$$

x + y + z = -1 + 1 + 0
= 0

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4)

$$\begin{cases} x + 2y - 3z = 29 \\ x + 3y + 2z = 4 \\ x - y - 2z = 8 \end{cases}$$

$$D = \left| \begin{array}{ccc|c} 1 & 2 & -3 & 29 \\ 1 & 3 & 2 & -2 \\ 1 & -1 & -2 & 4 \\ \hline 1 & 2 & -3 & -6 \\ 1 & 3 & 2 & 3 \\ \hline & & & 1 \end{array} \right|$$

$$D = 1 - (-15)$$

$$D = 16$$

$$Dx = \begin{vmatrix} 29 & 2 & -3 & 7 & -48 \\ 4 & 3 & 2 & 7 & -58 \\ 8 & -1 & -2 & 7 & -16 \\ 29 & 2 & -3 & 12 & -13 \\ 4 & 3 & 2 & 32 & \end{vmatrix}$$

$Dx = -130 + 146$
 $Dx = 16$

$$Dy = \begin{vmatrix} 1 & 29 & 3 & 7 & -12 \\ 1 & 4 & 2 & 6 & -58 \\ 1 & 8 & -2 & 8 & \\ 1 & 29 & -3 & -8 & \\ 1 & 4 & 2 & -24 & \\ 1 & & & 58 & \end{vmatrix}$$

$Dy = 80$

$$Dz = \begin{vmatrix} 1 & 2 & 29 & 7 \\ 1 & 3 & 4 & 16 \\ 1 & -1 & 8 & \\ 1 & 2 & 29 & 24 \\ 1 & 3 & 4 & -29 \\ 1 & & & 8 \end{vmatrix}$$

$Dz = -96$

$$Dx = \frac{16}{16} = 1$$

$$Dy = \frac{80}{16} = 5$$

$$Dz = \frac{-96}{16} = -6$$

$x + y + z = 1 + 5 - 6$
 $= 0$

5)

$$\begin{cases} 2x + y = 5 \\ 2y + z = 3 \\ 3x + 2y + z = 7 \end{cases}$$

$$D = \begin{vmatrix} 2 & 1 & 0 & 0 \\ 0 & 2 & 1 & 4 \\ 3 & 2 & 1 & 0 \\ 2 & 1 & 0 & 4 \\ 0 & 2 & 1 & 0 \\ 0 & 0 & 0 & 3 \end{vmatrix}_{\sim}$$

$$D = 3_{\sim}$$

$$D_x = \begin{vmatrix} 5 & 1 & 0 & 70 \\ 3 & 2 & 1 & 70 \\ 7 & 2 & 1 & 73 \\ 5 & 1 & 0 & 10 \\ 3 & 2 & 1 & 0 \\ 0 & 0 & 0 & 7 \end{vmatrix}_{\sim}$$

$$D_x = 17 - 3$$

$$D_x = 4,$$

$x = \frac{3}{4}$

$$D_y = \begin{vmatrix} 2 & 5 & 0 & 70 \\ 0 & 3 & 1 & 714 \\ 3 & 7 & 1 & 70 \\ 2 & 5 & 0 & 6 \\ 0 & 3 & 1 & 0 \\ 0 & 0 & 0 & 15 \end{vmatrix}_{\sim}$$

$$D_y = 21 - 14$$

$$D_y = 7,$$

$y = \frac{7}{3}$

$$D_z = \begin{vmatrix} 2 & 1 & 5 & 730 \\ 0 & 2 & 3 & 12 \\ 3 & 2 & 2 & 0 \\ 2 & 1 & 5 & 23 \\ 0 & 2 & 3 & 0 \\ 0 & 0 & 0 & 9 \end{vmatrix}_{\sim}$$

$$D_z = 37 - 42$$

$$D_z = -5$$

$z = \frac{-5}{3}$

(6)

$$\begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -1 & 2 & 2 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 7 \\ -1 \end{bmatrix} \Rightarrow x = 3 \text{ (I)}$$

$$\Rightarrow 2x + y = 7 \text{ (II)}$$

$$\Rightarrow -x + 2y + 2z = -1 \text{ (III)}$$

$$\text{(II)} \quad x = 3$$

$$2 \cdot 3 + y = 7$$

$$6 + y = 7$$

$$y = 1$$

$$\text{(III)} \quad x = 3$$

$$y = 1$$

$$\begin{aligned} -3 + 2 \cdot 1 + 2z &= -1 \quad \Rightarrow -1 + 2z = -1 \\ -3 + 2 + 2z &= -1 \end{aligned}$$

(E)

$$\begin{aligned} 2z &= -1 + 1 \\ 2z &= 0 \end{aligned}$$

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$$S = \begin{cases} 2x - y - 3z = -5 \\ x + 3y - z = 11 \\ x - 5z = 3 \end{cases}$$

$$\left(\begin{array}{ccc|c} 1 & 0 & -5 & 3 \\ 2 & -1 & -3 & -5 \\ 1 & 3 & -1 & 11 \end{array} \right) \sim \left(\begin{array}{ccc|c} 0 & -1 & 7 & -11 \\ 0 & 3 & 4 & 8 \end{array} \right) \sim \left(\begin{array}{ccc|c} 0 & -y & 7-1 & -11 \\ 0 & y & 4 & 8 \end{array} \right)$$

\downarrow

$$\begin{aligned} -y + 7 - 1 &= -11 \\ -y &= 9 (-1) \\ y &= 4 \end{aligned}$$

$$\begin{aligned} x - 5 - 1 &= 3 \\ x &= -2 \end{aligned}$$

$$\begin{aligned} 25z &= -25 \\ z &= -1 \end{aligned}$$

$$\textcircled{2} \quad \left\{ \begin{array}{l} x = 2y \\ 2y = 3z \\ x + y + z = 11 \end{array} \right. \quad \rightarrow \quad y = \frac{x}{2}, \quad z = 2 \cdot \left(\frac{x}{2} \right) = z = \frac{x}{3},$$

$$x + \left(\frac{x}{2} \right) + \left(\frac{x}{3} \right) = 11 \quad x \cdot 6 + \frac{x}{2} \cdot 6 + \frac{x}{3} \cdot 6 = 11 \cdot 6$$

$$\text{m.m.c} = 6$$

$$11x = 66$$

$$x = 6,$$

(3)

$$\begin{cases} x + y + z = 0 \\ 2x - 2z = 1 \\ 6y + 3z = -12 \end{cases}$$

$$\begin{aligned} x + (-9) + 2 &= 0 \\ x &= 7 \end{aligned}$$

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$$\xrightarrow{-2} \left(\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 2 & -1 & -2 & 1 \\ 0 & 6 & 3 & -12 \end{array} \right)$$

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$$\sim^2 \left(\begin{array}{ccc|c} 0 & -3 & -4 & 1 \\ 0 & 6 & 3 & -12 \end{array} \right)$$

$$\sim \left(\begin{array}{ccc|c} 0 & 0 & -5 & -10 \end{array} \right)$$

$$\begin{aligned} \downarrow -5z &= -10 \\ z &= 2 \end{aligned}$$

$$\begin{aligned} \downarrow -y + (-4) \cdot 2 &= 1 \\ y &= -9 \end{aligned}$$

:(4)

$$A + B + C = R\$ 68,00$$

$$\frac{B + 20 \cdot C}{100} = A \quad \Rightarrow \quad B \cdot \frac{C}{5} = a \quad \Rightarrow \quad 5B + C = 5a \quad \Rightarrow \quad 5A - 5B - C = 0$$

$$\frac{C + 20}{100} = A = 3 \cdot B \quad \Rightarrow \quad C \cdot \frac{A}{5} = 3B \quad \Rightarrow \quad 5C + A = 15B$$

$$A - 15B - 5C = 0$$

$$\begin{cases} A + B + C = 68 \\ 5A - 5B - C = 0 \\ A - 15B + 5C = 0 \end{cases}$$

$$D = \begin{vmatrix} 1 & 1 & 1 & -5 \\ 5 & -5 & -1 & 15 \\ 1 & -15 & 5 & 25 \\ 1 & 1 & 1 & -25 \\ 5 & -5 & -1 & 75 \end{vmatrix}$$

$$D = 101 \cdot -35 \\ D = -3560$$

$$D.A = \begin{bmatrix} 68 & 1 & 0 & 1020 \\ 0 & -5 & -1 & 0 \\ 0 & -15 & 5 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$D = -1700 - 1020 = -2720$$

$$A = \frac{D.A}{D} = -\frac{2720}{-136} = 20 \text{ R\$}$$

(5)

$$A = \begin{bmatrix} 0 & 3 & 4 \\ 1 & 0 & 5 \\ 2 & 1 & 0 \end{bmatrix} \quad x = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$\left\{ \begin{array}{l} 3x + 4z = 134 \\ x + 5z = 115 \\ 2x + y = 48 \end{array} \right. \quad \begin{array}{l} A = \text{R\$ } 134,00 \\ B = \text{R\$ } 115,00 \\ C = \text{R\$ } 48,00 \end{array}$$

$$D = \begin{bmatrix} 0 & 3 & 4 & 0 & 9 & 0 \\ 1 & 0 & 5 & 1 & 0 & 0 \\ 2 & 1 & 0 & 2 & 1 & 4 \end{bmatrix}$$

$$D = 34,,$$

$$DA = \begin{bmatrix} 134 & 3 & 4 & 134 & 3 & 0 \\ 115 & 0 & 5 & 115 & 0 & 0 \\ 48 & 1 & 0 & 48 & 1 & 0 \end{bmatrix}$$

670
460
720

$$DA = 510$$

$$\frac{DB}{D} = \left| \begin{array}{ccc|c} 0 & 134 & 4 & 920 \\ 1 & MS & S & 0 \\ 2 & 48 & 0 & 0 \\ 0 & 134 & 4 & 192 \\ 1 & 115 & S & 1340 \end{array} \right\}$$

$$D_2 = \left| \begin{array}{ccc|c} 0 & 3 & 134 & 0 \\ 1 & 0 & 115 & 0 \\ 2 & 1 & 48 & 144 \\ 0 & 3 & 134 & 0 \\ 1 & 0 & 115 & 134 \end{array} \right\} 680$$

$$x = \frac{Dx}{D} = \frac{510}{34} = 15$$

$$y = \frac{Dy}{D} = \frac{612}{34} = 18$$

$$z = \frac{Dz}{D} = \frac{680}{34} = 20$$

Total = 15 + 18 + 20
 = R\$ 53,00

$$\frac{DB}{D} = \left| \begin{array}{ccc|c} 0 & 134 & 4 & 920 \\ 1 & 115 & 5 & 0 \\ 2 & 98 & 0 & 0 \\ 0 & 134 & 4 & 192 \\ 1 & 115 & 5 & 1340 \end{array} \right\} 612$$

$$D_2 = \left| \begin{array}{ccc|c} 0 & 3 & 134 & 0 \\ 1 & 0 & 115 & 0 \\ 2 & 1 & 48 & 144 \\ 0 & 3 & 134 & 0 \\ 1 & 0 & 115 & 134 \\ \hline & & & 690 \end{array} \right\} 680$$

$$x = \frac{Dx}{D} = \frac{510}{34} = 15$$

$$y = \frac{Dy}{D} = \frac{612}{34} = 18$$

$$z = \frac{Dz}{D} = \frac{680}{34} = 20$$

Total = 15 + 18 + 20
 = R\$ 53,00