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Turma: **CTII 348**

IFSP - Câmpus Cubatão

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# Tarefa Básica 6
## - Regra de Cramer -

**1. a)**

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

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

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

$D_y = \begin{vmatrix} 2 & 2 \\ -1 & -3 \end{vmatrix}$ $\quad -6 - (-2) = \boxed{-4}$

$x = \frac{3}{5} \qquad y = \frac{-4}{5}$

$V = \left\{ \left( \frac{3}{5}, \frac{-4}{5} \right) \right\}$

**b)**

$$\begin{cases} 3x - y + z = 1 \\ 2x + 0 + 3z = -1 \\ 4x + y - 2z = 7 \end{cases}$$

$D = \begin{vmatrix} 3 & -1 & 1 \\ 2 & 0 & 3 \\ 4 & 1 & -2 \end{vmatrix}$ $\quad -10 - 13 = \boxed{-23}$

$D_x = \begin{vmatrix} 1 & -1 & 1 \\ -1 & 0 & 3 \\ 7 & 1 & -2 \end{vmatrix}$ $\quad -22 - 1 = \boxed{-23}$

$D_y = \begin{vmatrix} 3 & 1 & 1 \\ 2 & -1 & 3 \\ 4 & 7 & -2 \end{vmatrix}$ $\quad 32 - 55 = \boxed{-23}$

$D_z = \begin{vmatrix} 3 & -1 & 1 \\ 2 & 0 & -1 \\ 4 & 1 & 7 \end{vmatrix}$ $\quad 6 - (-17) = \boxed{23}$

$x = \frac{-23}{-23} = 1 \qquad y = \frac{-23}{-23} = 1 \qquad z = \frac{23}{-23} = -1$

$V = \{ (1, 1, -1) \}$

11

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2.

$$\begin{cases} 3x + 4y - z = 1 \\ 4x + 5y + 2z = 12 \\ x - 2y + 3z = 8 \end{cases}$$

$D =$ (regra de Sarrus)

| | | | | |
|---|---|---|---|---|
| 3 | 4 | -1 | 3 | 4 |
| 4 | 5 | 2 | 4 | 5 |
| 1 | -2 | 3 | 1 | -2 |

-5 -12 48

45 8 8

$61 - 31 = 30$

$D_y =$

| | | | | |
|---|---|---|---|---|
| 3 | 1 | -1 | 3 | 1 |
| 4 | 12 | 2 | 4 | 12 |
| 1 | 8 | 3 | 1 | 8 |

-12 48 12

108 2 -32

$78 - 48 = 30$

$y = \frac{30}{30} = \boxed{1}$

A

3.

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

$D =$

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 1 | 1 | 2 |
| 3 | 1 | -11 | 3 | 1 |
| 2 | 3 | -1 | 2 | 3 |

2 -33 -6

-1 -44 9

$-36 + 37 = \boxed{1}$

$D_x =$

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 1 | 1 | 2 |
| -2 | 1 | -11 | -2 | 1 |
| 1 | 3 | -1 | 1 | 3 |

1 -33 4

-1 -22 -6

$-29 + 28 = \boxed{-1}$

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

$D_y =$

| | | | | |
|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 |
| 3 | -2 | -11 | 3 | -2 |
| 2 | 1 | -1 | 2 | 1 |

-4 -11 -3

2 -22 3

$-17 + 18 = \boxed{1}$

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

$D_z =$

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 1 | 1 | 2 |
| 3 | 1 | -2 | 3 | 1 |
| 2 | 3 | 1 | 2 | 3 |

2 -6 6

1 -8 9

$2 - 2 = \boxed{0}$

$z = \frac{0}{1} = 0$

C

$a + b + c$

$-1 + 1 + 0 = \boxed{0}$

4.

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

$$D = \begin{vmatrix} 1 & 2 & -3 \\ 1 & 3 & 2 \\ 1 & -1 & -2 \end{vmatrix} \quad \begin{matrix} -9 & -2 & -4 \end{matrix} \quad \begin{matrix} 1 & 2 \\ 1 & 3 \\ 1 & -1 \end{matrix} \quad \begin{matrix} 1 & 2 \\ 1 & 3 \\ -6 & 4 \end{matrix} \quad 3 \quad 1 + 15 = \boxed{16}$$

$$D_x = \begin{vmatrix} 29 & 2 & -3 \\ 4 & 3 & 2 \\ 8 & -1 & -2 \end{vmatrix} \quad \begin{matrix} -72 & -58 & -16 \end{matrix} \quad \begin{matrix} 29 & 2 \\ 4 & 3 \\ 8 & -1 \end{matrix} \quad \begin{matrix} 29 & 2 \\ 4 & 3 \\ -174 & 32 \end{matrix} \quad -12 \quad -130 + 146 = \boxed{16}$$

$$x = \frac{16}{16} = \boxed{1}$$

$$D_y = \begin{vmatrix} 1 & 29 & -3 \\ 1 & 4 & 2 \\ 1 & 8 & -2 \end{vmatrix} \quad \begin{matrix} -12 & 16 & -58 \end{matrix} \quad \begin{matrix} 1 & 29 \\ 1 & 4 \\ 1 & 8 \end{matrix} \quad \begin{matrix} 1 & 29 \\ 1 & 4 \\ -8 & 58 \end{matrix} \quad -24 \quad 26 + 54 = \boxed{80}$$

$$y = \frac{80}{16} = \boxed{5}$$

$$D_z = \begin{vmatrix} 1 & 2 & 29 \\ 1 & 3 & 4 \\ 1 & -1 & 8 \end{vmatrix} \quad \begin{matrix} 87 & -4 & 16 \end{matrix} \quad \begin{matrix} 1 & 2 \\ 1 & 3 \\ 1 & -1 \end{matrix} \quad \begin{matrix} 1 & 2 \\ 1 & 3 \\ 24 & 8 \end{matrix} \quad -29 \quad 3 - 99 = \boxed{-96}$$

$$z = \frac{-96}{16} = \boxed{-6}$$

$$x + y + z$$

$$1 + 5 - 6 = \boxed{0}$$

A

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5. $$\begin{cases} 2x + y + 0 = 5 \\ 0 + 2y + z = 3 \\ 3x + 2y + z = 7 \end{cases}$$

$$D = \begin{vmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 3 & 2 & 1 \end{vmatrix} \quad \begin{matrix} 0 & 4 & 0 \end{matrix} \quad \begin{matrix} 2 & 1 \\ 0 & 2 \\ 3 & 2 \end{matrix} \quad \begin{matrix} 2 & 1 \\ 0 & 2 \\ 4 & 3 \end{matrix} \quad 0 \quad 7 - 4 = \boxed{3}$$

$$D_x = \begin{vmatrix} 5 & 1 & 0 \\ 3 & 2 & 1 \\ 7 & 2 & 1 \end{vmatrix} \quad \begin{matrix} 0 & 10 & 3 \end{matrix} \quad \begin{matrix} 5 & 1 \\ 3 & 2 \\ 7 & 2 \end{matrix} \quad \begin{matrix} 5 & 1 \\ 3 & 2 \\ 10 & 7 \end{matrix} \quad 0 \quad 17 - 13 = \boxed{4}$$

$$D_y = \begin{vmatrix} 2 & 5 & 0 \\ 0 & 3 & 1 \\ 3 & 7 & 1 \end{vmatrix} \quad \begin{matrix} 0 & 14 & 0 \end{matrix} \quad \begin{matrix} 2 & 5 \\ 0 & 3 \\ 3 & 7 \end{matrix} \quad \begin{matrix} 2 & 5 \\ 0 & 3 \\ 6 & 15 \end{matrix} \quad 0 \quad 21 - 14 = \boxed{7}$$

$$D_z = \begin{vmatrix} 2 & 1 & 5 \\ 0 & 2 & 3 \\ 3 & 2 & 7 \end{vmatrix} \quad \begin{matrix} 39 & 12 & 0 \end{matrix} \quad \begin{matrix} 2 & 1 \\ 0 & 2 \\ 3 & 2 \end{matrix} \quad \begin{matrix} 2 & 1 \\ 0 & 2 \\ 28 & 9 \end{matrix} \quad 0 \quad 37 - 42 = \boxed{-5}$$

$$x = \frac{4}{3} \quad y = \frac{7}{3} \quad z = \frac{-5}{3}$$

$$\boxed{\frac{4}{3} ; \frac{7}{3} ; -\frac{5}{3}}$$

D

11

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

$\begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -1 & 2 & 2 \end{pmatrix}$ $\begin{pmatrix} x+0+0 \\ 2x+y+0 \\ -x+2y+2z \end{pmatrix}$

$D = \begin{vmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ -1 & 2 & 2 \end{vmatrix}$ $\boxed{2}$

$D_x = \begin{vmatrix} 3 & 0 & 0 \\ 7 & 1 & 0 \\ -1 & 2 & 2 \end{vmatrix}$ $\begin{matrix} 0 & 0 & 0 \\ 3 & 0 & \\ 7 & 1 & \\ -1 & 2 & \\ 6 & 0 & 0 \end{matrix}$ $6 - 0 = \boxed{6}$

$D_y = \begin{vmatrix} 1 & 3 & 0 \\ 2 & 7 & 0 \\ -1 & -1 & 2 \end{vmatrix}$ $\begin{matrix} 0 & 0 & 12 \\ 1 & 3 & \\ 2 & 7 & \\ -1 & -1 & \\ 14 & 0 & 0 \end{matrix}$ $14 - 12 = \boxed{2}$

$D_z = \begin{vmatrix} 1 & 0 & 3 \\ 2 & 1 & 7 \\ -1 & 2 & -1 \end{vmatrix}$ $\begin{matrix} -3 & 14 & 0 \\ 1 & 0 & \\ 2 & 1 & \\ -1 & 2 & \\ -1 & 0 & 12 \end{matrix}$ $11 - 11 = \boxed{0}$

$x = 6/2 = \boxed{3}$ $y = 2/2 = \boxed{1}$ $z = 0/2 = \boxed{0}$

E

# Tarefa Básica 6
## - Escalonamento -

**1.**

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

$$\begin{matrix} -2 \\ \\ -1 \end{matrix}\left[\begin{array}{ccc|c} 2 & -1 & -3 & -5 \\ 1 & 3 & -1 & 11 \\ 1 & 0 & -5 & 3 \end{array}\right] \begin{matrix} \\ \sim \\ -7 \end{matrix}\left[\begin{array}{ccc|c} 0 & -7 & -1 & -27 \\ & & & \\ 0 & -3 & -4 & -8 \end{array}\right] \sim$$

$$\left[\begin{array}{ccc|c} & & & \\ & & & \\ 0 & 0 & 25 & -25 \end{array}\right]$$

$25z = -25$

$\boxed{z = -1}$

$-3y + 4 = -8$

$-3y = -12$

$\boxed{y = 4}$

$2x - 4 + 3 = -5$

$2x = -4$

$\boxed{x = -2}$

$\boxed{x = -2 \; ; \; y = 4 \; ; \; z = -1}$

2.

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

$2y = 3z$

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

$x + y + z = 11$

$2y + y + \frac{2y}{3} = 11$

$x = 2y$

$\boxed{x = 6}$

$2y = 3z$

$3z = 6$

$\boxed{z = 2}$

$\frac{6y + 3y + 2y}{3} = \frac{33}{3}$

$11y = 33$

$\boxed{y = 3}$

$x + 2y + 3z$

$6 + 6 + 6 = \boxed{18}$

B

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3.

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

$$\left[\begin{array}{c|cccc} & 1 & 1 & 1 & 0 \\ -2 & 2 & -1 & -2 & 1 \\ -3 & 0 & 6 & 3 & -12 \end{array}\right] \sim \left[\begin{array}{cccc} & & & \\ & & & \\ & & & \end{array}\right] \sim$$

$$\left[\begin{array}{cccc} 1 & 1 & 1 & 0 \\ 4 & 1 & 0 & 1 \\ -3 & 3 & 0 & -12 \end{array}\right]$$

$$\left[\begin{array}{cccc} & & & \\ & & & \\ -15 & 0 & 0 & -15 \end{array}\right]$$

$-15x = -15$

$\boxed{x = 1}$

$-3 + 3y = -12$

$3y = -9$

$\boxed{y = -3}$

$1 - 3 + z = 0$

$\boxed{z = 2}$

D

4.

$$\begin{cases} A+B+C=68 \\ 0,2C+B=A \\ 0,2A+C=3B \end{cases}$$

$(0,2C+B)+B+C=68$

$1,2C+2B=68$

$2B=68-1,2C$

(I) $B=34-0,6C$

$B=34-0,6\cdot 35$

$B=34-21$

$\boxed{B=13}$

$A+B+C=68$

$A+13+35=68$

$A=68-48$

$\boxed{A=20}$

$0,2A+C=3B$

(I) $\rightarrow 0,2A+C=3(34-0,6C)$

$0,2A+C=102-1,8C$

$2,8C+0,2A=102$

$2,8C+0,2(0,2C+B)=102$

$2,8C+0,04C+0,2B=102$

$2,84C+0,2B=102$

(I) $2,84C+0,2(34-0,6C)=102$

$2,84C-0,12C+6,8=102$

$2,72C=95,2$

$\boxed{C=35}$

Ali = R$ 20,00
Bia = R$ 13,00
Caco = R$ 35,00

Ali tem 7 reais a mais que Bia e 15 reais a menos que Caco.

A

5.

$$\begin{cases} 3y + 4z = 134 \\ x + 5z = 115 \\ 2x + y = 48 \end{cases}$$

$$D = \begin{vmatrix} 0 & 3 & 4 \\ 1 & 0 & 5 \\ 2 & 1 & 0 \end{vmatrix} \begin{matrix} 0 & 3 \\ 1 & 0 \\ 2 & 1 \end{matrix} \quad \boxed{34}$$

$$D_x = \begin{vmatrix} 134 & 3 & 4 \\ 115 & 0 & 5 \\ 48 & 1 & 0 \end{vmatrix} \begin{matrix} 134 & 3 \\ 115 & 0 \\ 48 & 1 \end{matrix} \quad 1180 - 670 = \boxed{510}$$

$$D_y = \begin{vmatrix} 0 & 134 & 4 \\ 1 & 115 & 5 \\ 2 & 48 & 0 \end{vmatrix} \begin{matrix} 0 & 134 \\ 1 & 115 \\ 2 & 48 \end{matrix} \quad 1532 - 920 = \boxed{612}$$

$$D_z = \begin{vmatrix} 0 & 3 & 134 \\ 1 & 0 & 115 \\ 2 & 1 & 48 \end{vmatrix} \begin{matrix} 0 & 3 \\ 1 & 0 \\ 2 & 1 \end{matrix} \quad 824 - 144 = \boxed{680}$$

$$x = \frac{510}{34} = \boxed{15} \qquad y = \frac{612}{34} = \boxed{18} \qquad z = \frac{680}{34} = \boxed{20}$$

$$x + y + z$$

$$15 + 18 + 20 = \boxed{R\$\ 53{,}00}$$

(A)