INSTITUTO FEDERAL DE EDUCAÇÃO, CIÊNCIA E TECNOLOGIA DE SÃO PAULO – CAMPUS CUBATÃO

Discente: Stephany da Costa Silva

Docente: Luciano Reis

Data: 09/06/2021

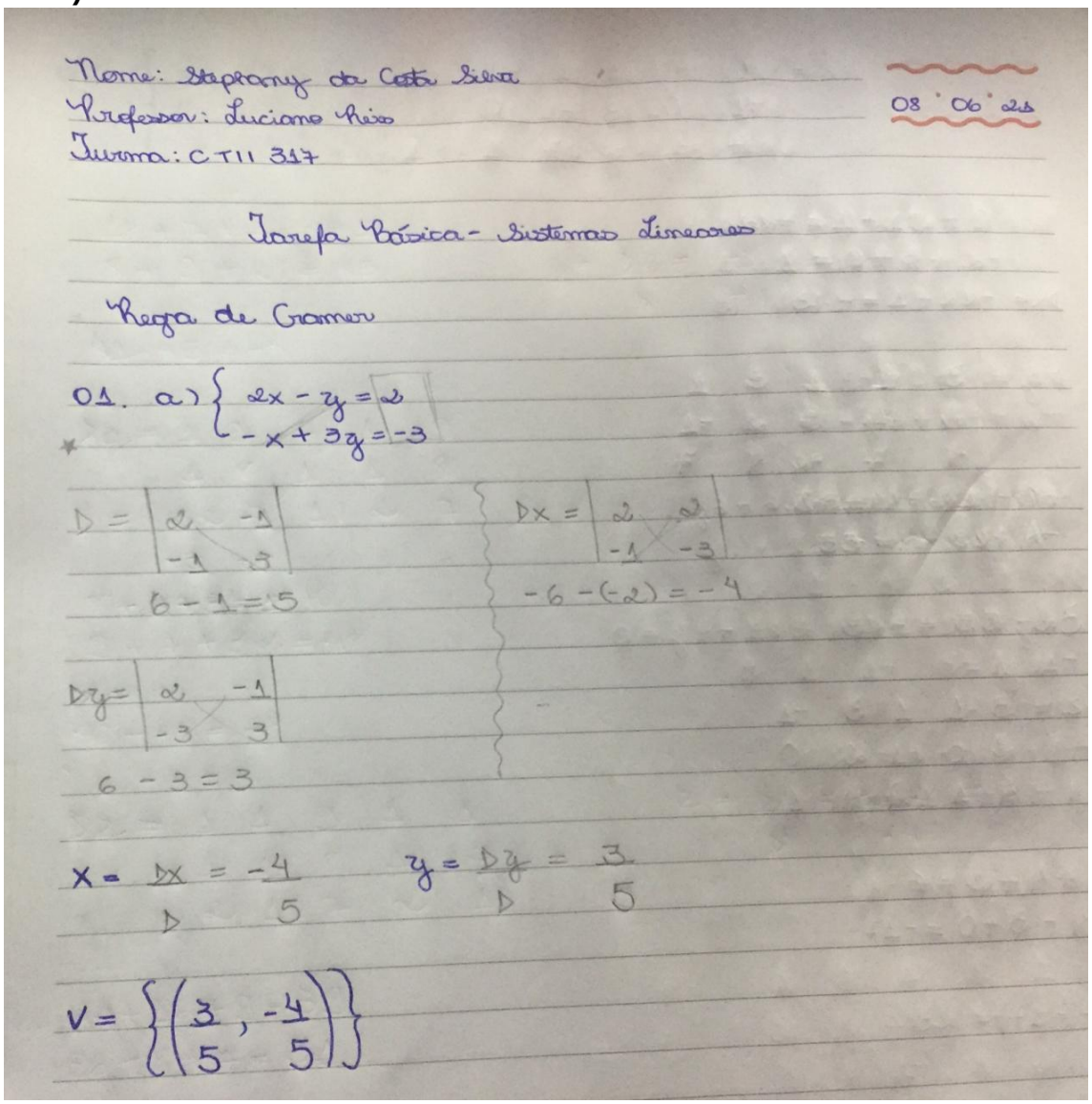
Turma: CTII 317

TAREFA BÁSICA – SISTEMAS LINEARES – REGRA DE CRAMER – ESCALONAMENTO (Gauss)

QUESTÕES

REGRA DE CRAMER

01. a)



Nome: Stephany da Costa Silva
Professor: Luciano Reis
Turma: CTII 317

08 / 06 / 21

Tarefa Básica - Sistemas Lineares

Regra de Cramer

01. a) $\begin{cases} 2x - y = 2 \\ -x + 3y = -3 \end{cases}$

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

$6 - 1 = 5$

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

$-6 - (-2) = -4$

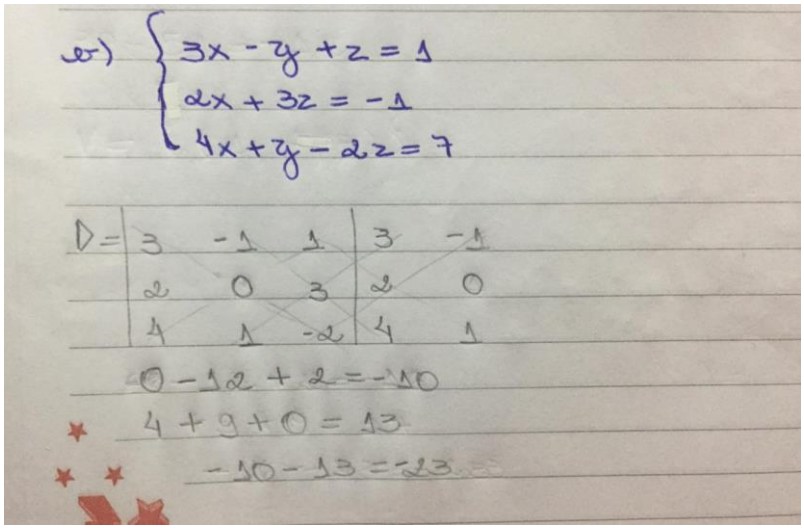
$D_y = \begin{vmatrix} 2 & -1 \\ -3 & 3 \end{vmatrix}$

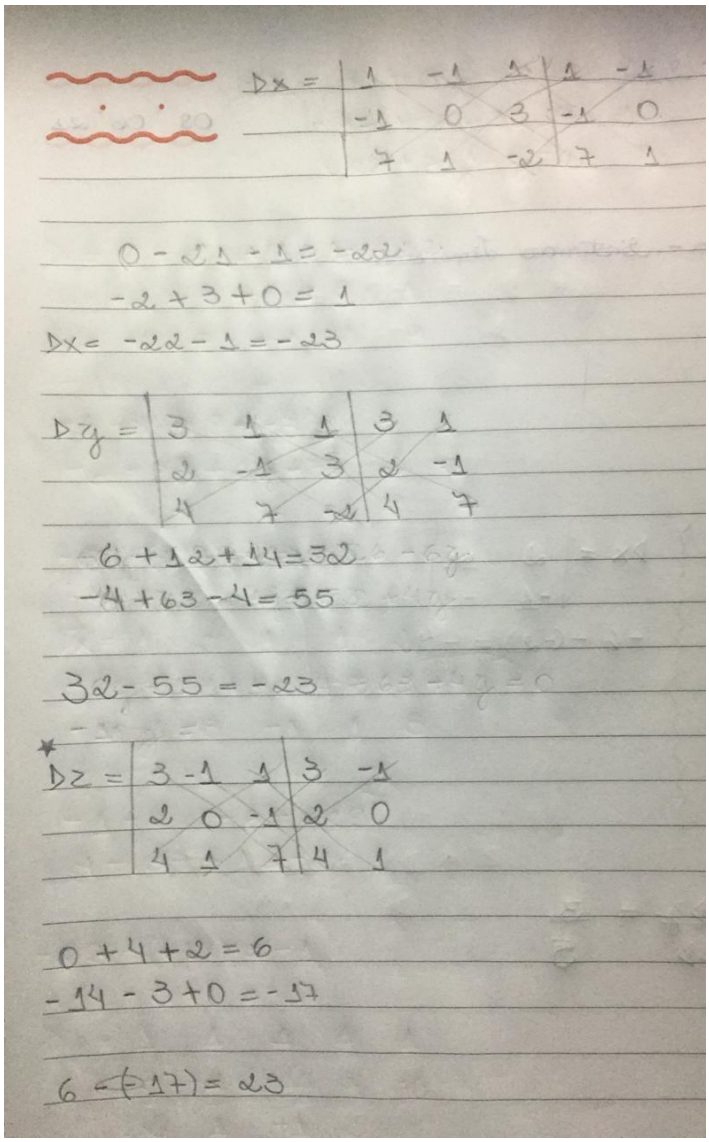
$6 - 3 = 3$

$x = \frac{D_x}{D} = \frac{-4}{5}$ $\quad y = \frac{D_y}{D} = \frac{3}{5}$

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

b)


b)
3x - y + z = 1
2x + 3z = -1
4x + y - 2z = 7
D =
0 - 12 + 2 = -10
4 + 9 + 0 = 13
-10 - 13 = -23


Dx =
0 - 21 - 1 = -22
-2 + 3 + 0 = 1
Dx = -22 - 1 = -23
Dy =
6 + 12 + 14 = 32
-4 + 63 - 4 = 55
32 - 55 = -23
Dz =
0 + 4 + 2 = 6
-14 - 3 + 0 = -17
6 - (-17) = 23

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

$0 + 4 + 2 = 6$

$-14 - 3 + 0 = -17$

$6 - (-17) = 23$

$$x = \frac{D_x}{D} = \frac{+23}{+23} = 1$$

$$y = \frac{D_y}{D} = \frac{+23}{+23} = 1$$

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

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

02.

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

$D = \begin{vmatrix} 3 & 4 & -1 \\ 4 & 5 & 2 \\ 1 & -2 & 3 \end{vmatrix}$ $\begin{matrix} 3 & 4 \\ 4 & 5 \\ 1 & -2 \end{matrix}$

$45 + 8 + 8 = 61$

$48 - 12 - 5 = 31$

$61 - 31 = 30$

$D_y = \begin{vmatrix} 3 & 1 & -1 \\ 4 & 12 & 2 \\ 1 & 8 & 3 \end{vmatrix}$ $\begin{matrix} 3 & 1 \\ 4 & 12 \\ 1 & 8 \end{matrix}$

$108 + 2 - 32 = 78$

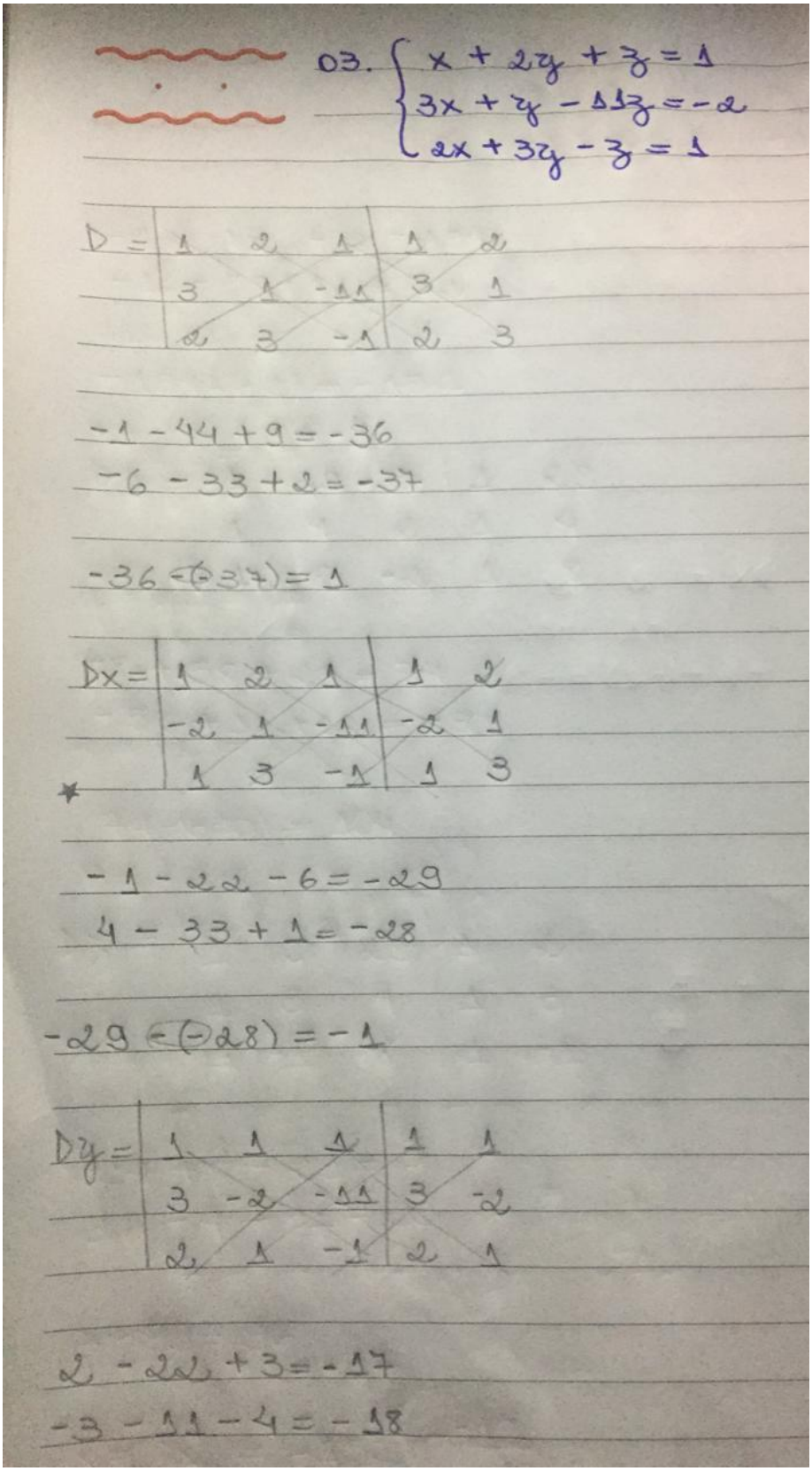
$12 + 48 - 12 = 48$

$78 - 48 = 30$

$y = \frac{D_y}{D} = \frac{30}{30} = 1$

Resposta: Letra A.

03.


03. $\begin{cases} x + 2y + z = 1 \\ 3x + y - 11z = -2 \\ 2x + 3y - z = 1 \end{cases}$
D = 1 2 1 | 1 2
3 1 -11 | 3 1
2 3 -1 | 2 3
-1 - 44 + 9 = -36
-6 - 33 + 2 = -37
-36 - (-37) = 1
Dx = 1 2 1 | 1 2
-2 1 -11 | -2 1
1 3 -1 | 1 3
-1 - 22 - 6 = -29
4 - 33 + 1 = -28
-29 - (-28) = -1
Dy = 1 1 1 | 1 1
3 -2 -11 | 3 -2
2 1 -1 | 2 1
2 - 22 + 3 = -17
-3 - 11 - 4 = -18

$D_z =$

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

$1 - 8 + 9 = 2$

$6 - 6 + 2 = 2$

$2 - 2 = 0$

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

$z = \frac{D_z}{D} = \frac{1}{1} = 1$

$a + b + c = -1 + 0 + 1$

$a + b + c = 0$

Resposta: Letra C.

04.

Q4. $\begin{cases} x + 2y - 3z = 29 \\ x + 3y + 2z = 4 \\ x - y - 2z = 8 \end{cases}$

$$D = \begin{vmatrix} 1 & 2 & -3 \\ 1 & 3 & 2 \\ 1 & -1 & -2 \end{vmatrix} \begin{matrix} 1 & 2 \\ 1 & 3 \\ 1 & -1 \end{matrix}$$

$-6 + 4 + 3 = 1$

$-4 - 2 - 9 = -15$

$1 + (-15) = 16$

$$D_x = \begin{vmatrix} 29 & 2 & 3 \\ 4 & 3 & 2 \\ 8 & -1 & -2 \end{vmatrix} \quad \begin{matrix} 29 & 2 \\ 4 & 3 \\ 8 & -1 \end{matrix}$$

$-174 + 32 + 12 = -154$

$-16 - 58 + 72 = -2$

$-154 - (-2) = -152$

$$D_y = \begin{vmatrix} 1 & 29 & 3 \\ 1 & 4 & 2 \\ 1 & 8 & -2 \end{vmatrix} \quad \begin{matrix} 1 & 29 \\ 1 & 4 \\ 1 & 8 \end{matrix}$$

$-8 + 58 + 24 = 74$

$-58 + 16 + 12 = -30$

$74 - (-30) = 104$

$$D_z = \begin{vmatrix} 1 & 2 & 29 \\ 1 & 3 & 4 \\ 1 & -1 & 8 \end{vmatrix} \quad \begin{matrix} 1 & 2 \\ 1 & 3 \\ 1 & -1 \end{matrix}$$

$24 + 8 - 29 = 3$

$16 - 4 + 87 = 99$

$3 - 99 = 96$

$$x = \frac{D_x}{D} = \frac{-152 : 8}{16 : 8} = \frac{-19}{2}$$

$$y = \frac{D_y}{D} = \frac{104 : 2}{16 : 2} = \frac{52 : 2}{8 : 2} = \frac{26 : 2}{4 : 2} = \frac{13}{2}$$

$$z = \frac{D_z}{D} = \frac{96}{16} = 6$$

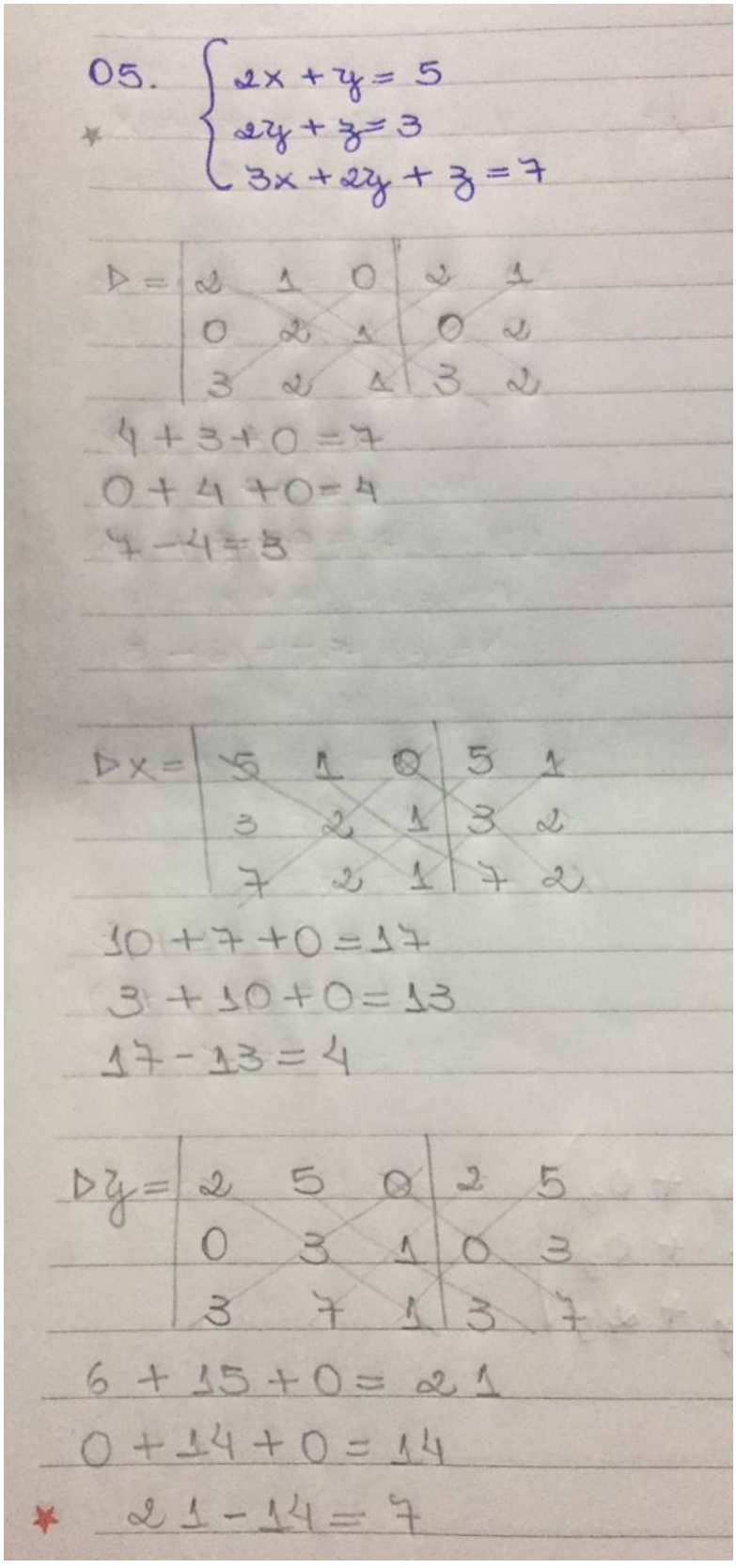
$x + y + z = -19 + 13 + 6$

$x + y + z = -19 + 19$

$x + y + z = 0$

Resposta: Letra A.

05.


05.
2x + y = 5
2y + z = 3
3x + 2y + z = 7
Δ =
4 + 3 + 0 = 7
0 + 4 + 0 = 4
7 − 4 = 3
Δx =
10 + 7 + 0 = 17
3 + 10 + 0 = 13
17 − 13 = 4
Δy =
6 + 15 + 0 = 21
0 + 14 + 0 = 14
21 − 14 = 7

$$\Delta z = \begin{vmatrix} 2 & 1 & 5 & 2 & 1 \\ 0 & 2 & 3 & 0 & 2 \\ 3 & 2 & 7 & 3 & 2 \end{vmatrix}$$

$28 + 9 + 0 = 37$

$0 + 12 + 30 = 32$

$37 - 32 = 5$

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

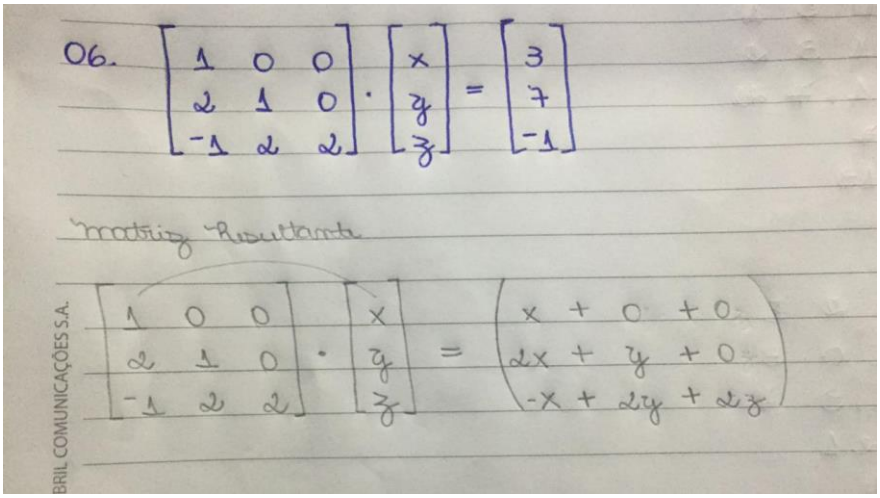
$$y = \frac{\Delta y}{\Delta} = \frac{7}{3}$$

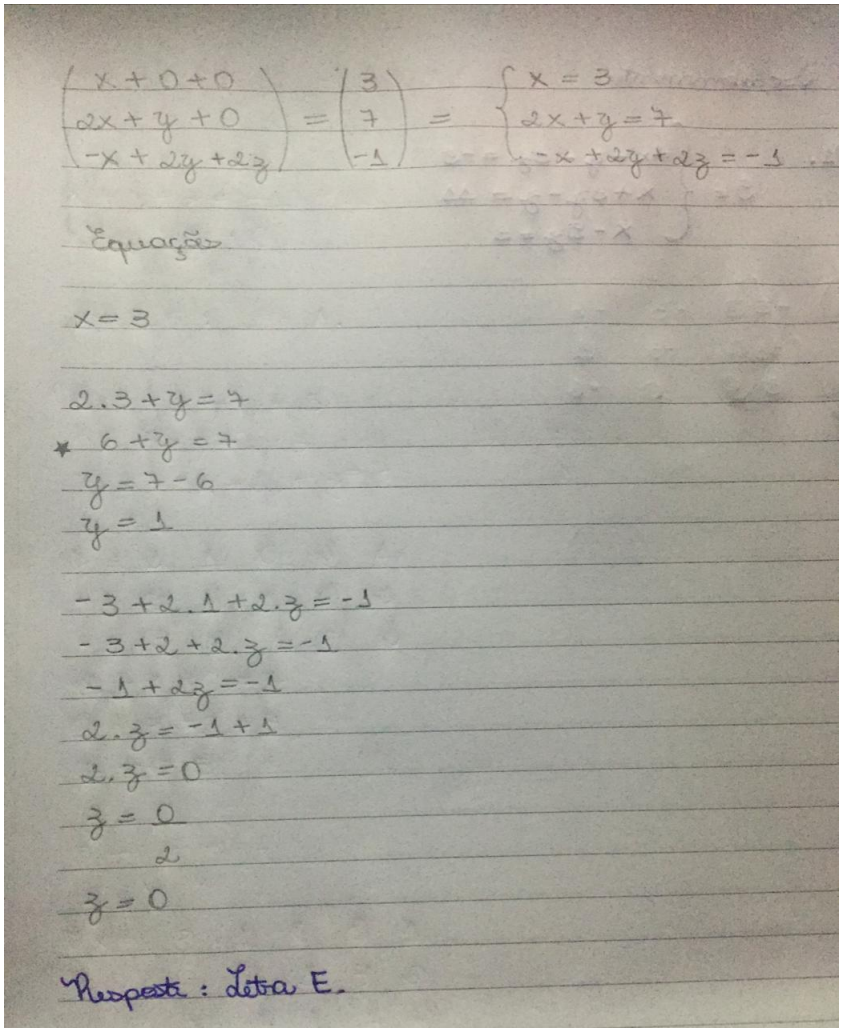
$$z = \frac{\Delta z}{\Delta} = \frac{5}{3}$$

$$V = \left\{ \left(\frac{4}{3}, \frac{7}{3}, \frac{5}{3} \right) \right\}$$

Resposta: Letra D.

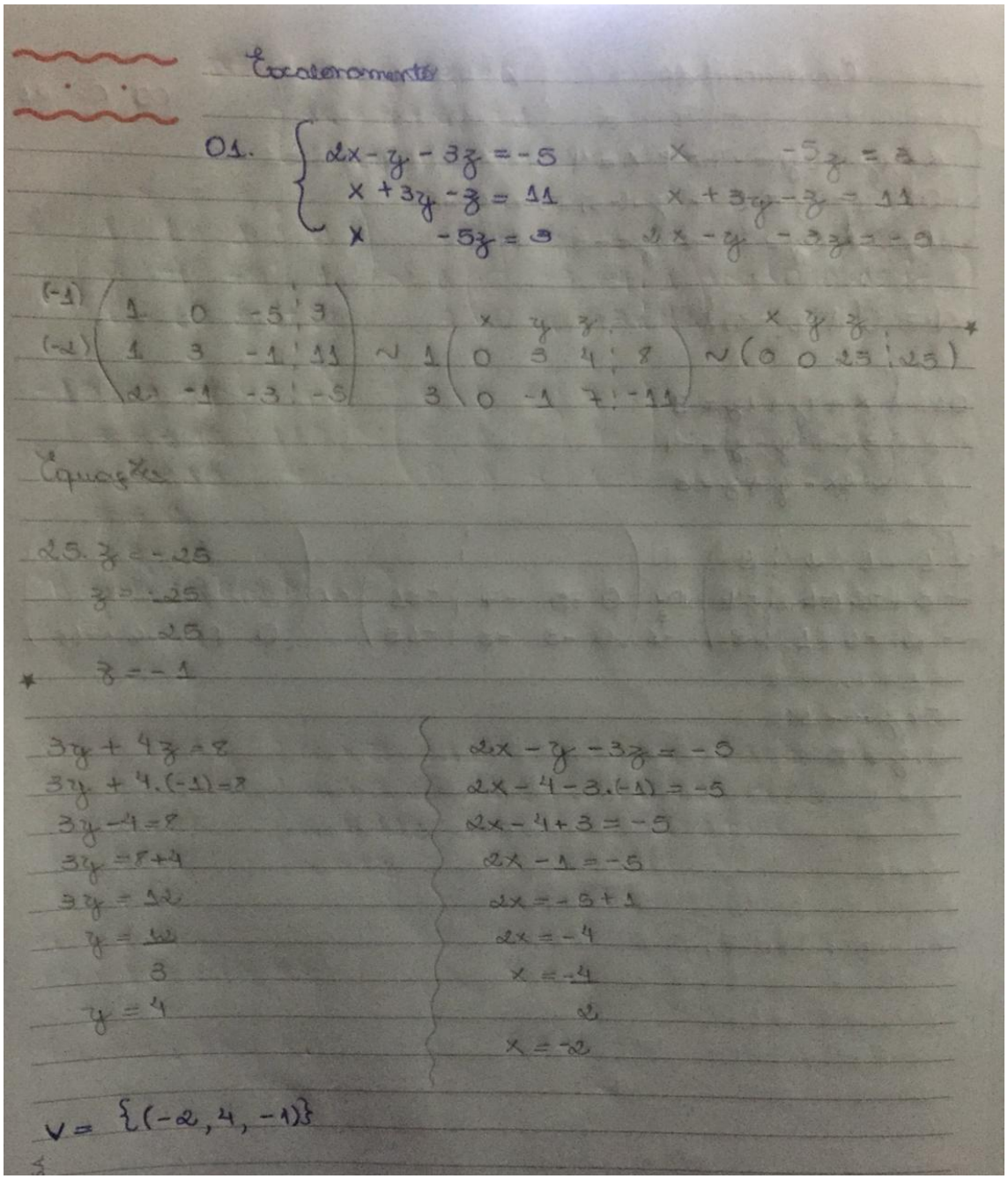
06.


06.
Matriz Resultante
BRIL COMUNICAÇÕES S.A.

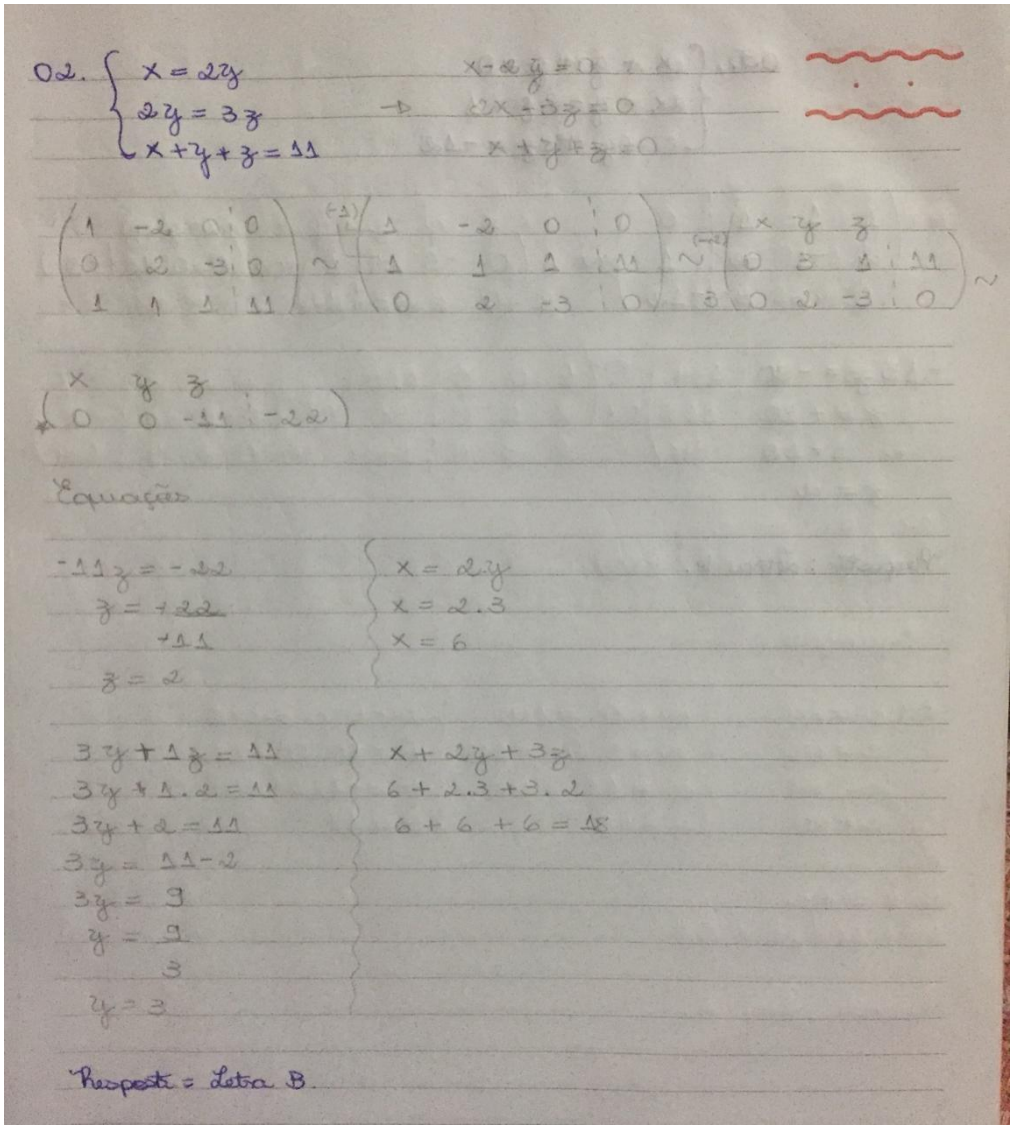

Equações
x = 3
2.3 + y = 7
6 + y = 7
y = 7 - 6
y = 1
-3 + 2.1 + 2.z = -1
-3 + 2 + 2.z = -1
-1 + 2z = -1
2.z = -1 + 1
2.z = 0
z = 0/2
z = 0
Resposta: Letra E.

ESCALONAMENTO

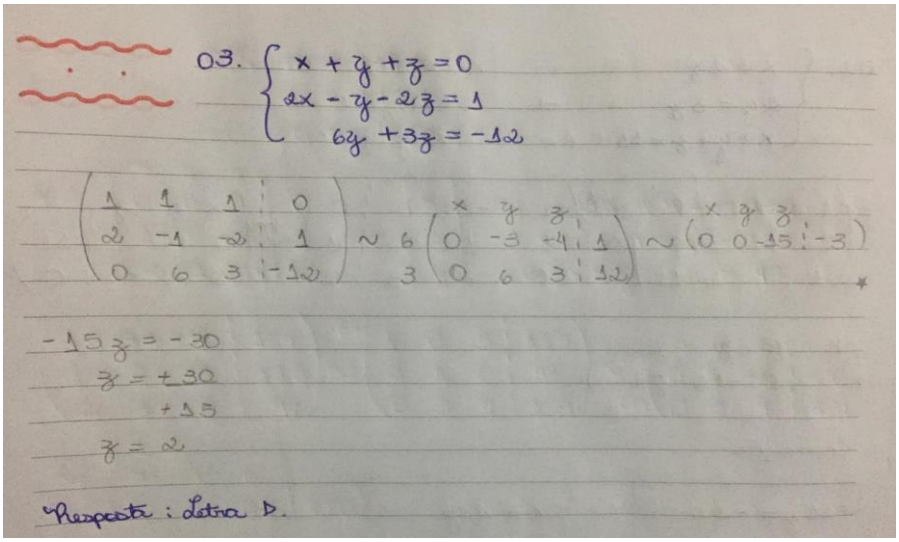
01.



02.


02. x = 2y
2y = 3z
x + y + z = 11
Equações
Resposta = Letra B.

03.


03. x + y + z = 0
2x - y - 2z = 1
6y + 3z = -12
Resposta : Letra D.

04.

04. $a + b + c = 68$

$b + \frac{20}{100} \cdot c = a$

$c + \frac{20}{100} \cdot a = 3 \cdot b$

$b + \frac{1}{5} c = a$

$\frac{5b + c}{5} = 5a$

$(-5)^*\ -5a + 5b + c$

$5a - 5b - c = 0$

$c + \frac{1}{5} a = 3b$

$\frac{5c + a}{5} = 150$

$a - 15b + 5c = 0$

$a + b + c = 68$

$5a - 5b - c = 0$

$a - 15b + 5c = 0$

$$\overset{(-1)}{\sim} \begin{pmatrix} 1 & 1 & 1 & 68 \\ 5 & -5 & -1 & 0 \\ 1 & -15 & 5 & 0 \end{pmatrix} \overset{\substack{+16 \\ -10}}{\sim} \begin{matrix} a & b & c & \\ \end{matrix} \begin{pmatrix} 0 & -10 & -6 & -340 \\ 0 & -16 & 4 & -68 \end{pmatrix} \sim$$

$$\begin{matrix} a & b & c & \\ \end{matrix} \begin{pmatrix} 0 & 0 & -136 & -4760 \end{pmatrix}$$

Equação

$-136c = -4760$

$c = -4760 : 136$

$c = 35$

$a + b + c = 68$

$a + 13 + 35 = 68$

$a = 68 - 48$

$a = 20$

$-10b - 6c = -340$

$-10b - 6 \cdot 35 = -340$

$-10b - 210 = -340$

$-10b = -340 + 210$

$-10b = -130$

$b = +130 : +10$

$b = 13$

$c - a$

$35 - 20 = 15$

Resposta: Letra A.

05.

05. a = 134,00
v = 115,00
c = 48,00

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

$$\begin{cases} 3y + 4z = 134 \\ x + 5z = 115 \\ 2x + 1y = 48 \end{cases}$$

$$\left(\begin{array}{ccc|c} 0 & 3 & 4 & 134 \\ 1 & 0 & 5 & 115 \\ 2 & 1 & 0 & 48 \end{array}\right) \xrightarrow{(-2)} \left(\begin{array}{ccc|c} 1 & 0 & 5 & 115 \\ 2 & 1 & 0 & 48 \\ 0 & 3 & 4 & 134 \end{array}\right) \xrightarrow[(1)]{(-3)} \left(\begin{array}{ccc|c} a & v & c & \\ 0 & 1 & -10 & -182 \\ 0 & 3 & 4 & 134 \end{array}\right)$$

$$\sim \left(\begin{array}{ccc|c} a & v & c & \\ 0 & 0 & 34 & 680 \end{array}\right)$$

Equações

$$34.c = 680 \qquad a + 5c = 115 \qquad v - 10c = -182$$
$$c = \frac{680}{34} \qquad a + 5.20 = 115 \qquad v - 10.20 = -182$$
$$c = 20 \qquad a = 115 - 100 \qquad v = -182 + 200$$
$$a = 15 \qquad v = 18$$

$a + v + c$

$15 + 18 + 20 = 53$

Resposta: Letra A.