Algebra Linear

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1 Exercício 3

Considere o conjunto W = $\{(x, y, z, w, t, u) \mid x, y, z, w, t, u \in R \land x + y + w + z + t + u = 0 \land y - w - z = 0 \land w + t - x = 0\} \subseteq R^6$.

Mostre que conjunto W é um subespaço do R-espaço vetorial \mathbb{R}^6 .

t - x = 0t = xy - w - z = 0y = w + z $x + y + w + z + t + u = 0 \rightarrow x + w + z + w + z + x + u = 0$ $u = -x - y - w - z - t \rightarrow u = -2x - 2w - 2z$ $W = \{(x, w + z, z, w, x, -x - w - z - w - z - x)\} \rightarrow$ $W = \{(x, w + z, z, w, x, -2x - 2w - 2z) \mid x, z, w \in R\}$ I) $0 \in W \text{ parax } = 0z = 0w = 0$ $(w, w, w, w, w, -w) \rightarrow (x, w + z, z, w, x, -2x - 2w - 2z)$ =(0,0,0,0,0,-0)=0Logo, $0 \in W$ II) $u, v \in W \to u + v \in W$, sendo:

 $u = (u1, u2, u3, u4, u5, -u6) \rightarrow (x_1, w_1 + z_1, z_1, w_1, x_1, -2x_1 - 2w_1 - 2z_1)$ $v = (v1, v2, v3, v4, v5, -v6) \rightarrow (x_2, w_2 + z_2, z_2, w_2, x_2, -2x_2 - 2w_2 - 2z_2)$ $\mathbf{u} + \mathbf{v} = (\mathbf{x}_1 + x_2, (w_1 + z_1) + (w_2 + z_2), z_1 + z_2, w_1 + w_2, x_1 + x_2, (-2x_1 - 2w_1 - 2z_2) + (-2x_2 - 2w_2 - 2z_2))$ $\mathbf{u} + \mathbf{v} = (\mathbf{x}_1 x_2, w_1 z_1 w_2 z_2, z_1, z_2, w_1 + w_2, x_1 + x_2, -2x_1 - 2x_2, -2w_1 - 2w_2, -2z_1 - 2z_2)$ Logo, $u + v \in aoconjuntoW$ III)a $\in R, v \in W \to av \in W$, sendo : $v = (v1, v2, v3, v4, v5, -v6) \rightarrow (x, w + z, z, w, x, -2x - 2w - 2z)$ $av = a \cdot (x_1, w_1 + z_1, z_1, w_1, x_1, -2x_1 - 2w_1 - 2z_1)$ $av = (a.x_1, a.w_1 + z_1, a.z_1, a.w_1, a.x_1, a. -2x_1 - 2w_1 - 2z_1)$ $av = (ax_1, aw_1w_2, az_1, aw_1, ax_1, a - 2x_1 - 2w_1 - 2z_1)$ Logo, av $\in aoconjuntoW$ Logo o conjunto W é subespaço vetorial de R6.

• O conjunto W = $\{(x, y, z) \mid x, y, z \in R \land x - z = 1 \land y + x = 0\}$

é um subsespaço vetorial de R3? Esboce graficamente W. $x - z = 1 \ a \ x = 1 + z$ y + x = 0 à y + 1 + z = 0 à y = -1 - z. $W = \{(1+z, -1-z, z)\}$

I) $0 \in W$, paraz = 0 (1+z, -1-z, z) à (1+0, -1-0, 0) = (1, -1, 0). $\label{logo} \verb|Logo||, 0 na oper tence a \verb|Wparaz| = 0. Por tanto, W no subespace torial.$

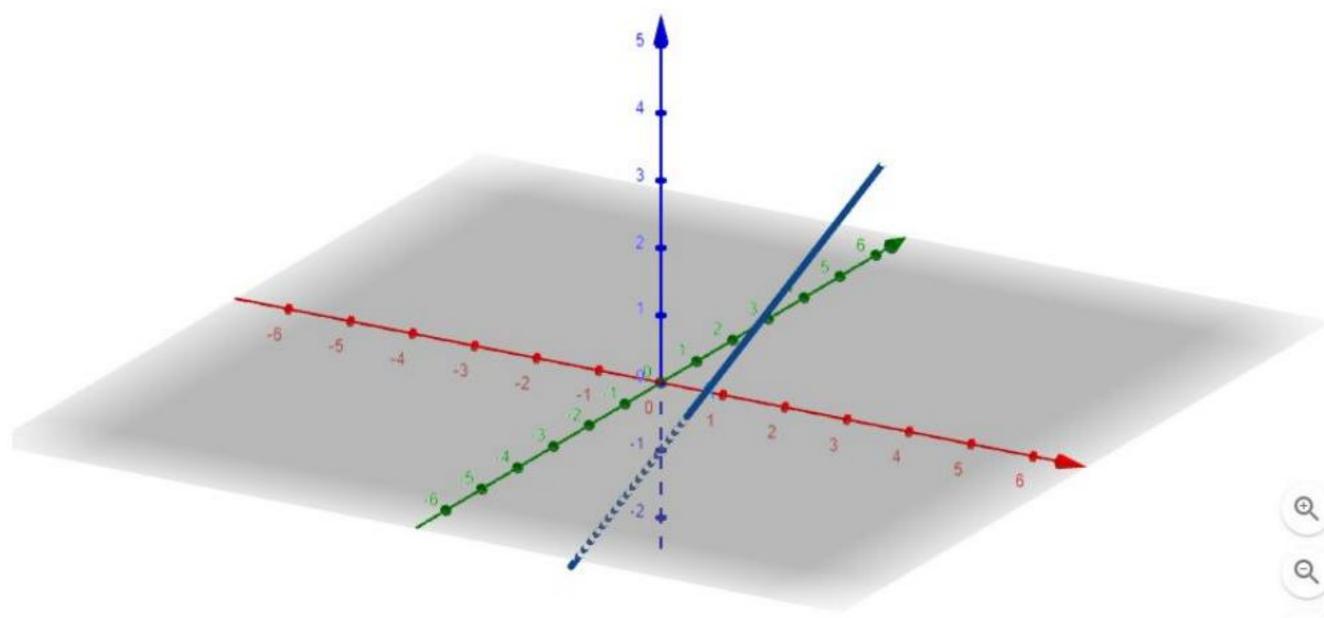


Figura 1: Representação gráfica do subespaço vetorial de R3.

• Invente seu subespaço vetorial em qualquer R n com n maior igual a 2. Mostre que o conjunto apresentado é de fato um subespaço vetorial. Não vale usar nenhum exemplo da aula ou da prova

 $Z = \{(x, y, z) \mid 2y + z = 0 \land x + y = 0\}$ 2y + z = 0 x + y = 0z = -2yx = -yZ = (-y, y, -2y) $Z = \{(-z, z, -z) \mid Z \in R\}$ I) $0 \in \mathbb{Z}$, paraz = 0 $(z, z, z) \ a \ (-y, y, -2y)$ $\mathbf{u} = (\mathbf{u}1, \mathbf{u}2, \mathbf{u}3)$ v = (v1, v2, v3) à (-y, y, -2y)u + v = (u1, u2, u3) + (-y, y, -2y)u + v = (u1 - y, u2 + y, -u3 - 2y)Logo, $u + v \in Z$ III) $a \in R, v \in Z \rightarrow av \in Z$. Sendo: $v = (v1, v2, v3) \ a(-y, y, -2y)$ $a.v = a \cdot (-y, y, -2y)$ $a.v = (a \cdot (-y), a \cdot y, a \cdot (-2y))$ a.v = (-ay, ay, -a 2y)Logo, av $\in Z$ Logo Z é subespaço vetorial de R3

2 Exercício 4

$\xrightarrow{Incio} \begin{bmatrix} -1\\1\\1\\1\\0\\1\\1 \end{bmatrix}$	1 2 0 2 -1 1 1 1 1 -1 -1 1 0 1	1 2 0 0 0 2 1 0 2 2 1 0 1 2	1 3 -1 0 -1 2 -1 0 -1 2 -1 1 1 2	a b c d e f g
$\xrightarrow{l2 \to l2 + l1} $	-1 1 0 1 1 -1 1 0 1 1 -1 1 0	2 1 4 1 1 0 1 1 -1 2 1 1 1 1	2 1 2 0 2 -1 0 -1 2 -1 0 -1 2 1	$egin{array}{c cccc} 3 & a & & \\ 3 & b+a & & \\ 2 & c & & \\ 0 & d & & \\ 2 & e & & \\ -1 & f & & \\ 2 & g & & \\ \end{array}$
$\xrightarrow{l3 \to l3 + l1}$ $\xrightarrow{l4 \to l4 + l1}$	-1 1 0 1 0 0 1 1 0 1 1 1 1 0 1 1 0 0 1 1 1 0 0 1 1 1 1 0 0 1	2 1 4 1 3 1 1 1 -1 2 1 1 1 1	2 1 2 0 4 0 0 -1 2 -1 0 -1 2 1	$egin{array}{cccccccccccccccccccccccccccccccccccc$
$ \begin{array}{cccc} 0 & 1 \\ 0 & 0 \\ 0 & 2 \\ 0 & 1 \end{array} $	2 1 2 4 1 2 3 1 4 3 2 2 -1 2 2 1 1 0 1 1 2	1 3 0 3 0 5 0 3 -1 2 -1 -1 1 2	$\begin{bmatrix} a \\ b+a \\ c+a \\ d+a \\ e \\ f \\ g \end{bmatrix}$	

$ \frac{l1 \rightarrow l1 - l2}{0 1 3 2 4 2 5} \begin{bmatrix} -1 0 -2 0 0 1 0 & 2a + b \\ 0 1 4 1 2 0 3 & b + a \\ 0 0 3 1 4 0 5 & c + a \\ 0 2 3 2 2 0 3 & d + a \\ 0 0 3 2 2 0 2 & f + a \\ 0 1 3 2 4 2 5 & g + a \end{bmatrix} \underbrace{ \begin{bmatrix} -1 0 -2 0 0 1 0 & 2a + b \\ 0 1 4 1 2 0 3 & b + a \\ 0 0 3 1 4 0 5 & c + a \\ 0 0 3 1 4 0 5 & c + a \\ 0 1 3/2 0 0 0 3/2 d + a/2 \\ 0 1 -1 2 2 -1 2 e \\ 0 0 3 2 2 0 2 f + a \\ 0 1 3 2 4 2 5 g + a \end{bmatrix} $
$ \frac{l4 \rightarrow l4 - l2}{0 0 1 4 1 2 0 0 1 0}{0 1 4 1 2 0 3} \begin{vmatrix} 2a + b \\ b + a \\ 0 0 3 1 4 0 5 \\ 0 0 -5/2 0 -1 0 -3/2 \\ 0 1 -1 2 2 -1 2 \\ 0 0 3 2 2 0 2 \end{vmatrix} \begin{vmatrix} 2a + b \\ b + a \\ c + a \\ d + 3a - 2b/2 \\ e \\ 0 1 3 2 4 2 5 \end{vmatrix} = \frac{l5 \rightarrow l5 - l2}{l5 \rightarrow l5} $
$ \frac{17 \to 17 - 12}{0 1 4 1 2 0 0 1 0}{0 0 3 1 4 0 5} \begin{vmatrix} 2a + b \\ b + a \\ 0 0 -5/2 0 -1 0 -3/2 \\ 0 0 -5 1 0 -1 -1 \\ 0 0 3 2 2 0 2 \\ 0 0 -1 1 2 2 2 \end{vmatrix} \begin{vmatrix} 2a + b \\ b + a \\ d + 3a - 2b/2 \\ e + b + a \\ d + a \\ g + 2a - b \end{vmatrix} $
$ \frac{14 \rightarrow -2.5.l4}{0 0 1 4 1 2 0 3 b+a \\ 0 0 1 1/3 4/3 0 5/3 c+a/3 \\ 0 0 1 0 2/5 0 3/5 -d+3a-2b/5 \\ 0 0 3 2 2 0 2 f+a \\ 0 0 -1 1 2 2 2 g+2a-b \\ \end{bmatrix} \xrightarrow{l5 \rightarrow l5/5} $
$ \frac{16 \rightarrow 16/3}{\rightarrow 1000000000000000000000000000000000000$
$ \frac{l^{5 \to l5 + l3}}{0 0 1 4 1 2 0 0 1 0}{0 0 1 1/3 4/3 0 5/3} \frac{2a + b}{c + a/3} \\ 0 0 0 1 1/3 4/3 0 5/3 c + a/3 \\ 0 0 0 -1/3 -14/15 0 16/15 \frac{-3d - 14a + 6b - 3c}{15} \\ 0 0 0 8/15 4/3 -1/5 22/15 \frac{8a + 3e - 3b + 3c}{15} \\ 0 0 1 2/3 2/3 0 2/3 f + a/3 \\ 0 0 -1 1 2 2 2 2 g + 2a - b \\ \end{bmatrix} \underbrace{ \begin{array}{c} -1 0 -2 0 0 1 0 2a + b \\ 0 1 4 1 2 0 3 b + a \\ 0 0 1 1/3 4/3 0 5/3 c + a/3 \\ 0 0 0 -1/3 -14/15 0 16/15 \frac{-3d - 14a + 6b - 3c}{8a + 3e - 3b + 3c} \\ 0 0 0 8/15 4/3 -1/5 22/15 \frac{8a + 3e - 3b + 3c}{15} \\ 0 0 0 1/3 -2/3 0 -1 f \cdot c/3 \\ 0 0 -1 1 2 2 2 g + 2a \cdot b \\ \end{array} \right] $
$ \begin{array}{c} \underbrace{l7 \rightarrow l7 + l3} \\ \bigcirc \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$
$ \frac{15 \rightarrow 15/8.15}{0 0 1 4 1 2 0 0 1 0}{0 1 4 1 2 0 3 0 5/3} \begin{array}{c} 2a + b \\ b + a \\ 0 0 1 1/3 4/3 0 5/3 c + a/3 \\ 0 0 0 1 14/5 0 16/5 \frac{-3d - 14a + 6b - 3c}{8} \\ 0 0 0 1 5/2 -3/8 11/4 \\ 0 0 0 1/3 -2/3 0 -1 \\ 0 0 0 4/3 10/3 2 11/3 \\ \end{array} \right] \underbrace{\begin{array}{c} -1 0 -2 0 0 1 0 \\ 0 1 4 1 2 0 3 \\ 0 0 1 1/3 4/3 0 5/3 \\ 0 0 0 1 14/5 0 16/5 \\ \frac{-3d - 14a + 6b - 5}{8} \\ 0 0 0 1 14/5 0 16/5 \\ 0 0 0 1 5/2 -3/8 11/4 \\ 0 0 0 1 5/2 -3/8 11/4 \\ 0 0 0 1 -2 0 -3 \frac{6c}{8} \\ 0 0 0 1 -2 0 -3 \frac{6c}{8} \\ 0 0 0 1 -2 0 -3 \frac{3g + 7a - 3b + c}{3} \\ \end{array} \right] $
$ \frac{15 \rightarrow 15 - 14}{ } \rightarrow \begin{bmatrix} -1 & 0 & -2 & 0 & 0 & 1 & 0 & 2a + b \\ 0 & 1 & 4 & 1 & 2 & 0 & 3 & b + a \\ 0 & 0 & 1 & 1/3 & 4/3 & 0 & 5/3 & c + a/3 \\ 0 & 0 & 0 & 1 & 14/5 & 0 & 16/5 & \frac{-3d - 14a + 6b -}{5} \\ 0 & 0 & 0 & 0 & -3/10 & -3/8 & -9/20 & \frac{8a + 3e - 3b + 3c}{8} \\ 0 & 0 & 0 & 1 & 5/2 & 3/2 & 11/4 & \frac{3g + 7a - 3b + c}{4} \end{bmatrix} $
$ \underbrace{\begin{array}{c cccccccccccccccccccccccccccccccccc$
$ \stackrel{16 \to -5/24.16}{\longrightarrow} \left[\begin{array}{cccccccccccccccccccccccccccccccccccc$
$ \underbrace{ \begin{bmatrix} -1 & 0 & -2 & 0 & 0 & 1 & 0 & & 2a+b \\ 0 & 1 & 4 & 1 & 2 & 0 & 3 & & b+a \\ 0 & 0 & 1 & 1/3 & 4/3 & 0 & 5/3 & & \frac{c+a}{3} \\ 0 & 0 & 0 & 1 & 14/5 & 0 & 16/5 & & -\frac{-3d-14a+6b-5c}{4} \\ 0 & 0 & 0 & 0 & 1 & 5/4 & 3/2 & & -\frac{-24a+5e+11b-5c-8d}{24} \\ 0 & 0 & 0 & 0 & 0 & -5/4 & -5/24 & & \frac{-20c+30e-5f-45d-130a+60b}{24} \\ 0 & 0 & 0 & 0 & 1 & -5 & 3/2 & & -\frac{5g+7a+3b-5c-4d}{2} \end{bmatrix} \underbrace{ \begin{bmatrix} -1 & 0 & -2 & 0 & 0 & 1 & 0 & & 2a+b \\ 0 & 1 & 4 & 1 & 2 & 0 & 3 & & b+a \\ 0 & 0 & 1 & 1/3 & 4/3 & 0 & 5/3 & & \frac{c+a}{3} \\ 0 & 0 & 1 & 1/3 & 4/3 & 0 & 5/3 & & \frac{c+a}{3} \\ 0 & 0 & 1 & 1/5 & 0 & 16/5 & & -\frac{-3d-14a+6b-5c}{3} \\ 0 & 0 & 0 & 1 & 14/5 & 0 & 16/5 & & -\frac{-3d-14a+6b-5c}{5} \\ 0 & 0 & 0 & 0 & 1 & 5/4 & 3/2 & & -\frac{-24a+5e+11b-5c-8d}{4} \\ 0 & 0 & 0 & 0 & 0 & -5/4 & -5/24 & & \frac{-20c+30e-5f-45d-130a+60b}{24} \\ 0 & 0 & 0 & 0 & 0 & 0 & -5/4 & -5/24 & & \frac{-20c+30e-5f-45d-130a+60b}{24} \\ 0 & 0 & 0 & 0 & 0 & 0 & -25/4 & 0 & & \frac{-38a+5e-10g+5b+5c}{4} \end{bmatrix} $
$ \underbrace{ \begin{bmatrix} -1 & 0 & -2 & 0 & 0 & 1 & 0 & & 2a+b \\ 0 & 1 & 4 & 1 & 2 & 0 & 3 & & b+a \\ 0 & 0 & 1 & 1/3 & 4/3 & 0 & 5/3 & & \frac{c+a}{3} \\ 0 & 0 & 0 & 1 & 14/5 & 0 & 16/5 & & -\frac{3d-14a+6b-5c}{5} \\ 0 & 0 & 0 & 0 & 1 & 5/4 & 3/2 & & -\frac{-24a+5c+11b-5c-8d}{4} \\ 0 & 0 & 0 & 0 & 0 & 1 & 1/6 & & -\frac{-4c+6e-f-9d-26a+12b}{6} \\ 0 & 0 & 0 & 0 & 0 & -25/4 & 0 & & \frac{-38a+5e-10g+5b+5c}{4} \\ \end{bmatrix} \underbrace{ t_{7\rightarrow -4/25.17} }_{t_{7}\rightarrow -4/25.17} $
$\underbrace{\begin{array}{c cccccccccccccccccccccccccccccccccc$

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	0	1	4	1	2	!	0	3	b+a			0	1	4	1	2	0	3			b+a	
	0	0	1	1/3	4/	3	0	5/3	$\frac{c+a}{3}$			0	0	1	1/3	4/3	0	5/3			$\frac{c+a}{3}$	
$\xrightarrow{l6-(1/6.l7)}$	0	0	0	1	14	/5	0	16/5	$-\frac{-3d-14a+6b-5c}{5}$	$l5 \rightarrow l$	$\xrightarrow{25-(3/2.l7)}$	0	0	0	1	14/5	0	16/5		- -3	$\frac{d-14a+6b-5c}{5}$	
	0	0	0	0	1		5/4	3/2	$\frac{-24a + 5e + 11b - 5c - 8d}{4}$			0	0	0	0	1	5/4	0	595e-	1932a+1345	$\frac{b - 655c + 1150d}{100}$	+360 <i>g</i> -150
	0	0	0	0	0)	1	0	$\frac{10g - 5e - 5c + 38a - 5b}{25}$			0	0	0	0	0	1	0		<u>10g-5</u>	$\frac{5e - 5c + 38a - 5b}{25}$	
	0	0	0	0	0)	0	1	$\left \begin{array}{c} -\frac{120e-422a+270b-130c-225d+60g-25f}{25} \end{array} \right $			0	0	0	0	0	0	1	- 120)e-422a+27	$\frac{0b - 130c - 225d}{25}$	+60g - 25f
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		1	4	1/3		/3	0	5/3	$b+a$ $\frac{c+a}{3}$				0		1	1/3	$\frac{2}{4/3}$			120e - 125c -	b+a 417 <i>a</i> +270 <i>b</i> -25	55d+60g-25
14 (16/5 17)		0	0	1,	,	1/5	0	0	1920e - 3525d - 3402a + 4170b - 1955c + 960g	q - 400f	19 19 (5	/9 1 7 \	0		0	,	$\frac{4}{5}$ $14/5$	0	0		15 $402a+4170b-1$	
$\xrightarrow{4-(16/5.l7)}$		0	0	0		1	5/4	0		-150 <i>f</i>	<u>l3→l3−(5</u>	/3.ℓ1)	0	0	0	0	14/0		0 -		$ \begin{array}{r} 125 \\ 345b - 655c + 11 \\ 50 \end{array} $	
		0	0	0		0	1	0	$ \begin{array}{c c} 50 \\ \underline{10g - 5e - 5c + 38a - 5b} \\ 25 \end{array} $				0	0	0	0	0	1	0 -			
		0	0	0		0	0	1	120e - 422a + 270b - 130c - 225d + 60g - 60c	25f			0	0	0	0	0		I		$\frac{g-5e-5c+38a-25}{25}$	
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		1		1		2	0	0	$\frac{360e + 835b - 1214a - 390c - 675d + 180g - 75}{25}$ $120e - 125c - 417a + 270b - 255d + 60g - 25$				0	1	4	1	2	0 0			$\frac{-390c - 675d + 2}{25}$ +270b - 255d + 6	
				1/		4/3	0	'	$\frac{120c - 125c - 417a + 210b - 255a + 60g - 25}{15}$ $1920e - 3525d - 3402a + 4170b - 1955c + 960g - 25$	400 f					1 1	,		0 0			+4170b-1955c	
$\xrightarrow{\rightarrow l2-(3.l7)}$				1		4/5	0	0	$\frac{125c - 3625a - 3122a + 11765 - 1366c + 366g - 1}{125}$ $595e - 1932a + 1345b - 655c + 1150d + 360g - 1$		$l5 \to l5 - (5/4)$	<u>.l6)</u>	0		0	1 14	,	0 0			125 $-315c+575d+1$	
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						0	1	0	$\frac{120e - 422a + 270b - 130c - 225d + 60g - 25}{25}$	f							0	1 0	120e		$\frac{3c+6ca-6c}{25}$ -130c-225d+	60a-25 f
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ſ	-1	0 -	-2	0	0	0	0		$\frac{12a + 5e + 30b - 10g + 5c}{25}$]		-1	0	-2	0	0	0 0		$\underline{12a}$ +	$\frac{5e + 30b - 10g}{25}$	1+5c	1
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	0	0	1	1/3	4/3	0	0	12	$\frac{10e - 125c - 417a + 270b - 255d + 60g - 25f}{15}$			0	0	1	1/3	4/3	0 0	120e	-125c-41	7a + 270b - 25 15	55d + 60g - 25f	
$\xrightarrow{\rightarrow l1-l6}$	0	0	0	1	14/5	5 0	0	1920e	$\begin{array}{r} -3525d - 3402a + 4170b - 1955c + 960g - 400f \\ 125 \end{array}$	$l4 \rightarrow l4$	$\xrightarrow{-(14/5.l5)}$	0	0	0	1	0	0 0	169	g+60e-30	$\frac{2d+161a-25}{5}$	b+10c-16f	
	0	0	0	0	1	0	0	60	$\frac{e - 1061a + 685b - 315c + 575d + 155g - 75f}{50}$			0	0	0	0	1	0 0	60e-	1061a+68	$\frac{5b - 315c + 57}{50}$	5d + 155g - 75f	
	0	0	0	0	0	1	. 0		$\frac{10g - 5e - 5c + 38a - 5b}{25}$			0	0	0	0	0	1 0		<u>10g</u> -	$\frac{-5e - 5c + 38a}{25}$	<u>-5b</u>	
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			1				0 0		0e+835b-1214a-390c-675d+180g-75f 25) 1				0 0				$\frac{6c-135d+32}{5}$	- 1	
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$\to l3 - (4/3.l5)$	\rightarrow	0		0			0 0		$\frac{16g+60e-302d+161a-25b+10c-16f}{5}$	$l2 \rightarrow l2$		0		1		0 0	1			$\frac{61a - 25b + 10}{5}$		
				0			0 0	l I	10a-5e-5c+38a-5b				0	0		0 0				$\frac{15c+575d+1}{50}$	<u> </u>	
				0			 0 0 1 	1	$\frac{10g - 5e - 5c + 38a - 5b}{25}$ $20e - 422a + 270b - 130c - 225d + 60g - 25f$ 25		(0	0		1 0 0 1	'			$\frac{6c + 38a - 5b}{25}$ $\frac{130c - 225d + 6}{25}$	60g - 25f	
	l	1	0	9	0 0	0	0		12a+5e+30b-10q+5c	J	[1 0	9 (0	ما		12a-	+5e+30b-	-10q + 5c	-	J	
					0 0		'	74e-	$\frac{12a+5e+30b-10g+5c}{25}$ $-169b-258a-76c-135d+32g-15f$		-1 0		, 0			16g-			$\frac{-10g+5c}{a-86c+16}$	7d+f		
					$\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$		'		$\begin{array}{c} -169b - 258a - 76c - 135d + 32g - 15f \\ 5 \\ 5 \\ 20e - 655c - 3042a + 1495b + 235d - 45f \end{array}$		$\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$) 0	0	1				a - 86c + 16 a + 1495b + 2			
3→13=(1/9 14		0			1 0		'		$\begin{array}{c} 120e - 655c - 3042a + 1495b + 235d - 45f \\ \hline 75 \\ + 60e - 302d + 161a - 25b + 10c - 16f \end{array}$	→19. 14		1 C	. U		0			02d+161a	a+1495b+2 $a-25b+106$			
$3 \to l3 - (1/3.l4)$	→				0 1				$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\xrightarrow{\rightarrow l2-l4}$	$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$	0 0	. U	0				5 85b-315 <i>c</i>	c+575d+15			
					$\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$				$ \begin{array}{c} 50 \\ \underline{10g - 5e - 5c + 38a - 5b} \\ 25 \end{array} $		0 0				·			50 $-5e-5c+$		_		
					0 0			_ <u>120e</u>	$ \begin{array}{c} 25 \\ -422a + 270b - 130c - 225d + 60g - 25f \\ 25 \end{array} $		0 0			_				25)c-225d+6	60g - 25f		
		O	O			Ü	-		25				, 0		1			25		_		
	\[-1	0	-2	0	0	0	0		$\frac{12a + 5e + 30b - 10g + 5c}{25}$		\[-1	0	0	0 0	0 0	0	330g+	-655e-60	48a+3080 75	b-1295c+47	0d-90f	
	0	1	0	0	0	0	0 =	480g - 1	$\begin{array}{c} 25 \\ 070e - 3070b + 5883a + 1330c + 1565d + 195f \\ \hline 75 \end{array}$		0	1	0	0 0	0	0 =				a+1330c+15	-	
	0	0	1	0	0	0	0	180g+	320e - 655c - 3042a + 1495b + 235d - 45f		0	0	1	0 0	0	0	180g-	+320e−65		+1495b+235	6d-45f	
$\xrightarrow{l2 \to l2 - (4.l3)}$	0	0	0	1	0	0	0	16	y+60e-302d+161a-25b+10c-16f	$l1 \rightarrow l1 +$	(2.13) 0	0	0	1 0	0	0	16	6g+60e-3		a-25b+10c-	16 <i>f</i>	
		0	0	0	1	0	n	60e-	1061a + 685b - 315c + 575d + 155g - 75f						0	'	60e-	-1061 <i>a</i> +6		+575d+155g	<u>1–75f</u>	

	$\int 1$	0	0	0	0	0	$0 \mid -\frac{330g + 655e - 6048a + 3080b - 1295c + 470d - 90f}{75}$
	0	1		0	0		$0 \; \mid \; \tfrac{-480g - 1070e - 3070b + 5883a + 1330c + 1565d + 195f}{75}$
	0	0	1	0	0	0	$0 \; \mid \; \frac{180g + 320e - 655c - 3042a + 1495b + 235d - 45f}{75}$
$\xrightarrow{l1 \rightarrow -1.l1}$	0	0	0	1	0	0	$0 \mid \frac{16g + 60e - 302d + 161a - 25b + 10c - 16f}{5}$
	0	0	0	0	1	0	$0 \;\; \Big \;\; \frac{60e - 1061a + 685b - 315c + 575d + 155g - 75f}{50}$
	0	0	0	0	0	1	$0 \mid \frac{10g - 5e - 5c + 38a - 5b}{25}$
	0	0	0	0	0	0	$1 \; \mid \; \; -\frac{120e - 422a + 270b - 130c - 225d + 60g - 25f}{25}$
	L						

 $\begin{bmatrix} 0 & 0 & 0 & 0 & 1 & 0 & 0 \end{bmatrix} = \frac{60e - 1061a + 685b - 315c + 575d + 155g - 75f}{50}$

 $\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$ $-\frac{120e - 422a + 270b - 130c - 225d + 60g - 25f}{25}$

 $0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 1 \quad 0 \mid \frac{10g - 5e - 5c + 38a - 5b}{25}$

3 Coordenadas

Portanto o conjunto forma base para o espaço vetorial R7 e as coordenadas são $B = \frac{216}{5}$; -23; 21; $\frac{-241}{5}$; $\frac{217}{10}$; 15; $\frac{19}{5}$

 $0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 1 \quad \left| \quad -\frac{120e - 422a + 270b - 130c - 225d + 60g - 25f}{25} \right|$

 $0 \quad 0 \quad 0 \quad 0 \quad 1 \quad 0 \mid \frac{10g - 5e - 5c + 38a - 5b}{25}$