Escalonamento

$$(1,-2,1) + s(1,1,1) + t(-1,1,0) = (3,2,1) + u(2,1,1) + v(1,1,2)$$

s	t	u	v	
1	-1	-2	-1	2
1	1	-1	-1	4
1	0	-1	-2	0

→

1	-1	-2	-1	2
0	2	1	0	2
0	1	1	-1	-2

↓

1	0	-3/2	-1	3
0	2	1	0	2
0	0	1/2	-1	-3

←

1	0	0	-4	-6
0	2	0	2	8
0	0	1/2	-1	-3

$$s = 4v - 6$$
$$2t = 8 - 2v \rightarrow t = 4 - v$$
$$\frac{u}{2} = v - 3 \rightarrow u = 2v - 6$$

$$\boxed{(s,t,u) = (-6,4,-6) + v(4,-1,2)}$$

π_2: $(3,2,1) + u(2,1,1) + v(1,1,2)$

$(3,2,1) + -6(2,1,1) + 2v(2,1,1) + v(1,1,2)$

$$\boxed{(-9,-4,-5) + v(5,3,4)}$$

RETA

$\pi_1 \cap \pi_2$

x_1	x_2	x_3	x_4	x_5	
1	2	-1	0	1	3
2	1	0	-1	-2	0
3	1	-2	1	1	2
1	1	1	-2	1	3
0	0	1	-1	-1	0

→

1	2	-1	0	1	3
0	-3	2	-1	-4	-6
0	-5	1	1	-2	-7
0	-1	2	-2	0	0
0	0	1	-1	-1	0

↓

1	0	1/3	-2/3	-5/3	-1
0	-3	2	-1	-4	-6
0	0	-7/3	8/3	14/3	3
0	0	4/3	-5/3	4/3	2
0	0	1	-1	-1	0

←

7	0	0	-2	-7	-4
0	-21/6	0	3/2	0	-4
0	0	-7/3	8/3	14/3	3
0	0	0	-1/4	7	13/2
0	0	0	1/3	7/3	3

$3 + \frac{7}{3}\alpha$

$$\left(\begin{array}{ccccc|c} -\frac{7}{8} & 0 & 0 & 0 & \frac{63}{8} & 7 - \frac{63}{8}x_5 \\ 0 & -\frac{7}{12} & 0 & 0 & 7 & \frac{35}{6} - 7x_5 \\ 0 & 0 & -\frac{7}{32} & 0 & \frac{238}{32} & \frac{219}{32} - \frac{238}{32}x_5 \\ 0 & 0 & 0 & -\frac{1}{4} & 7 & \frac{13}{2} - 7x_5 \\ 0 & 0 & 0 & 0 & \frac{35}{4} & \frac{35}{4} \end{array}\right) \longrightarrow x_5 = 1$$

$x_1 = 1$

$x_2 = 2$

$x_3 = 3$

$x_4 = 2$

$$\frac{35}{4} + \frac{7}{4}\alpha \longrightarrow x_5 = 1 + \frac{\alpha}{5} - \frac{2}{5}\beta$$

$$x_1 = 1 - \frac{8}{7}\left(-\frac{63}{8} \; \frac{\alpha}{5}\right) = 1 + \frac{9}{5}\alpha - \frac{3}{5}\beta$$

$$x_2 = 2 - \frac{12}{7}\left(-7\,\frac{\alpha}{5}\right) = 2 + \frac{12}{5}\alpha - \frac{4}{5}\beta$$

$$x_3 = 3 - \frac{32}{7}\left(-\frac{238}{32}\,\frac{\alpha}{5}\right) = 3 + \frac{34}{5}\alpha - \frac{13}{5}\beta$$

$$x_4 = 2 - 4\left(-7\,\frac{\alpha}{5}\right) = 2 + \frac{28}{5}\alpha - \frac{11}{5}\beta$$

x_1	x_2	x_3	x_4	x_5	
1	2	-1	0	1	3
2	1	0	-1	-2	0
3	1	-2	1	1	2
1	1	1	-2	1	3
0	0	1	-1	-1	0

α

controle !!! $\{1,2,3,2,1\} + \frac{\alpha}{5}\{9,12,34,28,1\}$

1) $x_1 + 2x_2 - x_3 + x_5 = 3$

$1 + 4 - 3 + 1 = 3$ ✓

$9 + 24 - 34 + 1 = 0$ ✓

2) $2x_1 + x_2 - x_4 - 2x_5 = 0$

$2 + 2 - 2 - 2 = 0$ ✓

$18 + 12 - 28 - 2 = 0$ ✓

3) $3x_1 + x_2 - 2x_3 + x_4 + x_5 = 2$

$3 + 2 - 6 + 2 + 1 = 2$ ✓

$27 + 12 - 68 + 28 + 1 = 0$ ✓

4) $x_1 + x_2 + x_3 - 2x_4 + x_1 = 3$

$1 + 2 + 3 - 4 + 1 = 3$ ✓

$9 + 12 + 34 - 56 + 1 = 0$ ✓

5) $x_3 - x_4 - x_5 = 0$

$3 - 2 - 1 = 0$ ✓

$\frac{1}{5}(34 - 28 - 1) = 1$ ✓

Incluir na segunda equação o parámetro beta

$2x_1 + x_2 - x_4 - 2x_5 = \beta$