

Melhorando a técnica de escalonamento

EX 1

$$x + 2y + z = 2$$

$$3x + 8y + z = 12$$

$$4y + z = 2$$



$$\begin{array}{ccc|c} 1 & 2 & 1 & 2 \\ 3 & 8 & 1 & 12 \\ 0 & 4 & 1 & 2 \end{array}$$

$$\begin{pmatrix} 1 & 0 & 0 \\ a & 1 & 0 \\ b & c & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 1 \\ 3 & 8 & 1 \\ 0 & 4 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 2 & 1 \\ 0 & x & x \\ 0 & 0 & x \end{pmatrix}$$

21: $a + 3 = 0$

$a = -3$

31: $b + 3c = 0$

$b = -3c$

$b = 6$

32: $2b + 8c + 4 = 0$

$c = -2$

$$\begin{array}{ccc|ccc|c} 1 & 0 & 0 & 1 & 2 & 1 & 2 \\ -3 & 1 & 0 & 3 & 8 & 1 & 12 \\ 6 & -2 & 1 & 0 & 4 & 1 & 2 \end{array}$$

$2, 1, -2$

$$\begin{array}{ccc|c} 1 & 2 & 1 & 2 \\ 0 & 2 & -2 & 6 \\ 0 & 0 & 5 & -10 \end{array}$$

$x = -2y - z + 2 \rightarrow 2$
 $2y = 2z + 6 \rightarrow y = 1$
 $\rightarrow z = -2$

EX 2

$$\begin{array}{ccc|c} 1 & -1 & -2 & 2+v \\ 1 & 1 & -1 & 4+v \\ 1 & 0 & -1 & 2v \end{array}$$

$$\begin{pmatrix} 1 & 0 & 0 \\ a & 1 & 0 \\ b & c & 1 \end{pmatrix} \begin{pmatrix} 1 & -1 & -2 \\ 1 & 1 & -1 \\ 1 & 0 & -1 \end{pmatrix} = \begin{pmatrix} 1 & -1 & -2 \\ 0 & x & x \\ 0 & 0 & x \end{pmatrix}$$

21: $a + 1 = 0$ $a = -1$

31: $b + c + 1 = 0 \rightarrow c = -1/2$

32: $-b + c = 0$ $b = c$

$$\begin{array}{ccc|ccc|c} 1 & 0 & 0 & 1 & -1 & -2 & 2+v \\ -1 & 1 & 0 & 1 & 1 & -1 & 4+v \\ -1/2 & -1/2 & 1 & 1 & 0 & -1 & 2v \end{array} \rightarrow \begin{array}{ccc|c} 1 & -1 & -2 & 2+v \\ 0 & 2 & 1 & 2 \\ 0 & 0 & 1/2 & -3+v \end{array}$$

$$S = t + 2u + 2 + v = 4 - v - 12 + 4v + 2 + v = -6 + 4v$$

$$2t = -u + 2 \rightarrow t = 4 - v$$

$$\frac{1}{2}u = -3 + v \rightarrow u = -6 + 2v$$

$$\text{SOLUÇÃO } (-6, 4, -6) + v(4, -1, 2)$$

EX 3

$$x + 2y + z + 4w = 2$$

$$2x + z + 3w = 1$$

$$3y + 2z + w = 1$$

$$x + y + z - w = 2$$

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ a & 1 & 0 & 0 \\ b & c & 1 & 0 \\ e & f & g & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 1 & 4 \\ 2 & 0 & 1 & 3 \\ 0 & 3 & 2 & 1 \\ 1 & 1 & 1 & -1 \end{pmatrix}$$

$$21) a + 2 = 0$$

$$31) b + 2c = 0$$

$$41) e + 2f + g = 0$$

$$32) 2b + 3 = 0$$

$$42) 2e + 3g + 1 = 0$$

$$43) e + f + 2g + 1 = 0$$

$$a = -2, b = -\frac{3}{2}, c = \frac{3}{4}$$

$$41 - 43) f = 2g$$

$$41) e + 4g + 1 = 0$$

$$42) 2e + 3g + 1 = 0$$

$$2 \times 41 - 42) 5g = -1$$

$$e = -\frac{1}{5}, f = -\frac{2}{5}, g = -\frac{1}{5}$$

$$\begin{array}{cccc|cccc} 1 & 0 & 0 & 0 & 1 & 2 & 1 & 4 & 2 \\ -2 & 1 & 0 & 0 & 2 & 0 & 1 & 3 & 1 \\ -3/2 & 3/4 & 1 & 0 & 0 & 3 & 2 & 1 & 1 \\ -1/5 & -2/5 & -1/5 & 1 & 1 & 1 & 1 & -1 & 2 \end{array}$$

$$\begin{array}{cccc|c} 1 & 2 & 1 & 4 & 2 \\ 0 & -4 & -1 & -5 & -3 \\ 0 & 0 & 5/4 & -11/4 & -5/4 \\ 0 & 0 & 0 & -16/5 & 1 \end{array}$$

$$w = -\frac{5}{16}$$

$$\frac{5}{4}z = -\frac{11}{4} - \frac{5}{16} - \frac{5}{4} \Rightarrow z = -\frac{11}{16} - 1 \Rightarrow$$

$$z = -\frac{27}{16}$$

$$4y = 3 - z - 5w = 3 + \frac{27}{16} + \frac{25}{16} = \frac{90}{16}$$

$$y = \frac{25}{16}$$

$$x = -2y - z - 4w + 2 = -\frac{50}{16} + \frac{27}{16} + \frac{20}{16} + 2$$

$$x = \frac{29}{16}$$

$$\frac{1}{16}(29, 25, -27, -5)$$

$$\begin{array}{rcl} 29 + 50 - 27 - 20 & = & 32 \quad \checkmark \\ 58 - 27 - 15 & = & 16 \quad \checkmark \\ 75 - 54 - 5 & = & 16 \quad \checkmark \\ 29 + 25 - 27 + 5 & = & 32 \quad \checkmark \end{array}$$