

Systemes

OP elem.

$L_1 \leftrightarrow L_2$

Matrice

$3x_1 + 2x_2 + x_3 - x_4 = 8$   
 $x_1 - x_2 + x_3 - 3x_4 = 5$   
 $2x_1 - x_2 + 2x_3 - x_4 = 3$   
 $3x_1 - 6x_2 + x_3 - 2x_4 = 4$

Matrice  
augmentee  
du  
systeme

$$\begin{pmatrix} 3 & 2 & 1 & -1 & 8 \\ 1 & -1 & 1 & -3 & 5 \\ 2 & -1 & 2 & -1 & 3 \\ 3 & -6 & 1 & -2 & 4 \end{pmatrix}$$

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$$\begin{pmatrix} 1 & -1 & 1 & -3 & 5 \\ 3 & 2 & 1 & -1 & 8 \\ 2 & -1 & 2 & -1 & 3 \\ 3 & -6 & 1 & -2 & 4 \end{pmatrix}$$

$L_2 \leftarrow L_2 - 3L_1$  OP don.

$L_3 \leftarrow L_3 - 2L_1$

$L_4 \leftarrow L_4 - 3L_1$

$$\begin{pmatrix} 1 & -1 & 1 & -3 & 5 \\ 0 & 5 & -2 & 8 & -7 \\ 0 & 1 & 0 & 5 & -7 \\ 0 & -3 & -2 & 7 & -11 \end{pmatrix}$$

$L_2 \leftrightarrow L_3$

$$\begin{pmatrix} 1 & -1 & 1 & -3 & 5 \\ 0 & 1 & 0 & 5 & -7 \\ 0 & 5 & -2 & 8 & -7 \\ 0 & -3 & -2 & 7 & -11 \end{pmatrix}$$

$L_3 \leftarrow L_3 - 5L_2$

$L_4 \leftarrow L_4 + 3L_2$

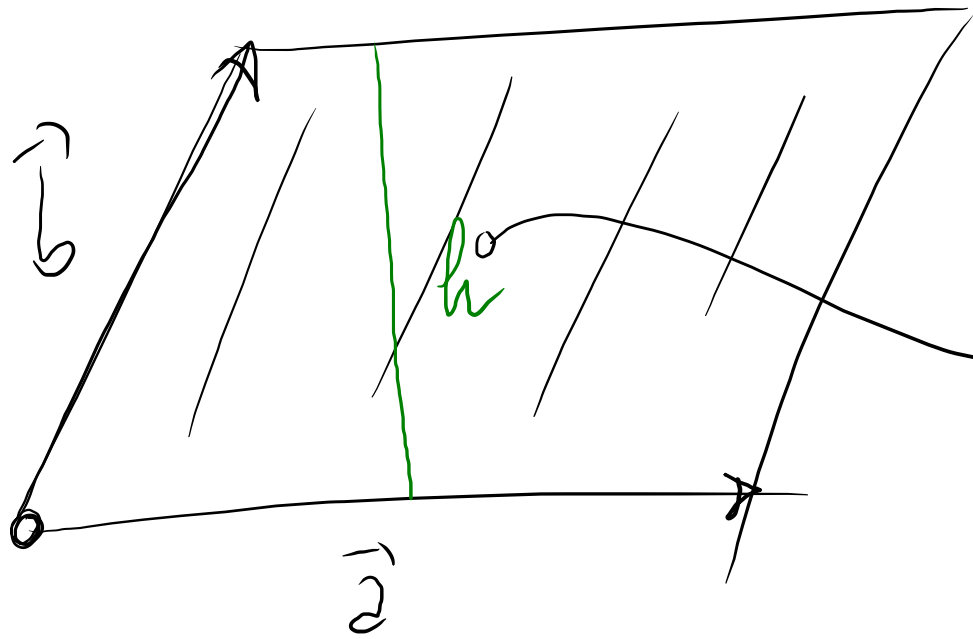
$$\begin{pmatrix} 1 & -1 & 1 & -3 & 5 \\ 0 & 1 & 0 & 5 & -7 \\ 0 & 0 & -2 & -12 & 28 \\ 0 & 0 & -2 & 22 & -32 \end{pmatrix}$$

$L_4 \leftarrow L_4 - L_3$

$$\begin{pmatrix} 1 & -1 & 1 & -3 & 5 \\ 0 & 1 & 0 & 5 & -7 \\ 0 & 0 & -2 & -12 & 28 \\ 0 & 0 & 0 & 34 & -60 \end{pmatrix}$$

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$$\begin{aligned} x_1 - x_2 + x_3 - 3x_4 &= 5 \\ x_2 + 5x_4 &= -7 \\ -2x_3 - 12x_4 &= 28 \\ 34x_4 &= -60 \end{aligned}$$



$$A = \|\vec{a} \times \vec{b}\|$$

$$h = \frac{A}{\|\vec{a}\|}$$

$$\alpha \begin{pmatrix} 2 \\ 1 \\ 2 \end{pmatrix} + \beta \begin{pmatrix} 1 \\ k \\ 1 \end{pmatrix} = \begin{pmatrix} 3 \\ 1 \\ k \end{pmatrix}$$

if  $k \neq \frac{1}{2}$

$$2\alpha + \beta = 3$$

$$\alpha + k\beta = 1$$

$$2\alpha + \beta = k$$

$$\alpha + k\beta = 1$$

$$0 = k - 3 \quad | \quad k = 3$$

$$\begin{cases} \alpha + k\beta = 1 \\ 2\alpha + \beta = 3 \\ 2\alpha + \beta = k \end{cases}$$

$$\begin{cases} \alpha + k\beta = 1 \\ \beta - 2k\beta = 1 \\ \beta - 2k\beta = k - 2 \end{cases}$$

$$\frac{1}{1-2k} = \frac{k-2}{1-2k} \Rightarrow k = 3$$

$$\begin{cases} \alpha + k\beta = 1 \\ \beta(1-2k) = 1 \\ \beta(1-2k) = k-2 \end{cases} \quad \beta = \frac{1}{1-2k}$$

$$\beta = \frac{k-2}{1-2k}$$

$$\begin{pmatrix} 2 \\ 1 \\ 2 \end{pmatrix} = 2 \cdot \begin{pmatrix} 1 \\ 1/2 \\ 1 \end{pmatrix}$$

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

$$= 2k^2 - 2 - (k - 3) + 2(1 - 3k) = 0$$

$$\Leftrightarrow 2k^2 - 2 - k + 3 + 2 - 6k = 0$$

$$\Leftrightarrow 2k^2 - 7k + 3 = 0 \Leftrightarrow (2k - 1)(k - 3) = 0$$