

Exercice 1 :

$$\vec{b} = -1 \vec{e}_1 - 1 \vec{e}_2 = \begin{pmatrix} -1 \\ -1 \end{pmatrix}$$

$$\vec{c} = -3 \vec{e}_2 + 4 \vec{e}_1 = 4 \vec{e}_1 - 3 \vec{e}_2 = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$$

$$\vec{d} = 2 \vec{e}_1 + 0 \vec{e}_2 = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$$

$$\vec{e} = -3 \vec{e}_2 - 2 \vec{e}_1 - \frac{1}{3} \vec{e}_1 = \begin{pmatrix} -\frac{7}{3} \\ -3 \end{pmatrix}$$

$$\vec{f} = \begin{pmatrix} 0 \\ -3 \end{pmatrix}$$

Exercice 2:

$$\vec{a} = \begin{pmatrix} 3,5 \\ -2 \end{pmatrix}$$

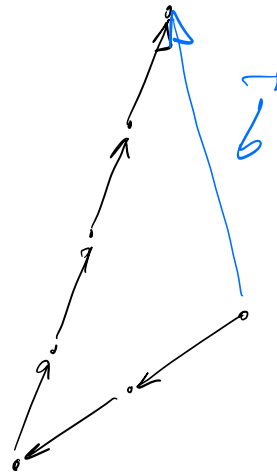
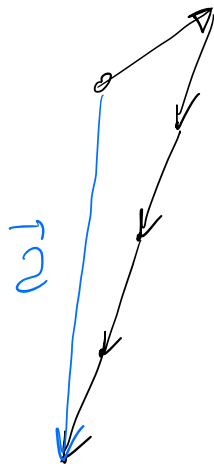
$$\vec{b} = \begin{pmatrix} 0 \\ -4 \end{pmatrix}$$

$$\vec{c} = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$$

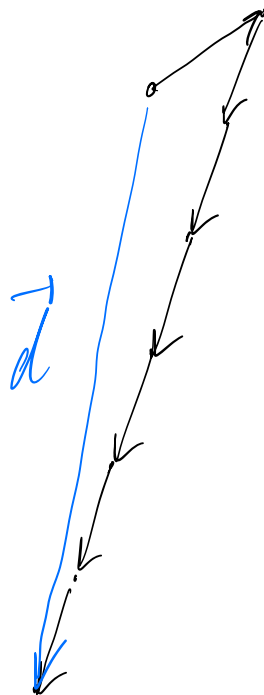
$$\vec{d} = \begin{pmatrix} -3 \\ 7 \end{pmatrix}$$

$$\vec{f} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$$

Exercice 3:



\vec{c}

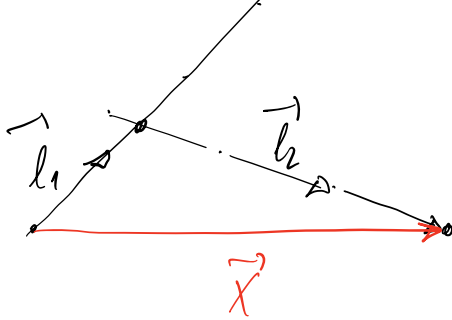


Exercice 4:

$$a) \vec{l}_1 = \begin{pmatrix} 14 \\ 0 \end{pmatrix} \quad \vec{l}_2 = \begin{pmatrix} 0 \\ 8 \end{pmatrix}$$

$$\vec{x} = \begin{pmatrix} -1/7 \\ -1/4 \end{pmatrix} = -\frac{1}{7} \vec{l}_1 - \frac{1}{4} \vec{l}_2$$

$$b) \vec{l}_1 = \begin{pmatrix} 2 \\ 2 \end{pmatrix} \quad \vec{l}_2 = \begin{pmatrix} 3 \\ -1 \end{pmatrix} \quad \vec{x} = \begin{pmatrix} 11 \\ 0 \end{pmatrix}$$



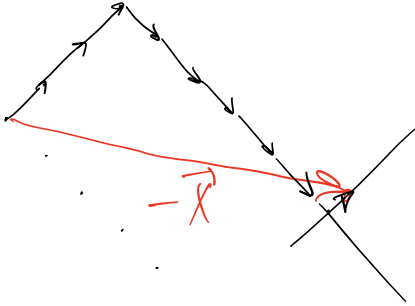
$$\vec{x} = \begin{pmatrix} 1,4 \\ 2,7 \end{pmatrix}$$

$$\begin{pmatrix} 11 \\ 0 \end{pmatrix} = x_1 \begin{pmatrix} 2 \\ 2 \end{pmatrix} + x_2 \begin{pmatrix} 3 \\ -1 \end{pmatrix} \Leftrightarrow \begin{cases} 2x_1 + 3x_2 = 11 \\ 2x_1 - x_2 = 0 \end{cases}$$

$$\Rightarrow x_2 = 2x_1 \Rightarrow 2x_1 + 3(2x_1) = 11 \Rightarrow 8x_1 = 11 \Rightarrow x_1 = \frac{11}{8}$$

$$\Rightarrow x_2 = \frac{11}{4} \Rightarrow x = \begin{pmatrix} 11/8 \\ 11/4 \end{pmatrix} = \begin{pmatrix} 1,375 \\ 2,75 \end{pmatrix}$$

c)



$$-\vec{x} = 3\vec{l}_2 + 5\vec{l}_1 + \frac{1}{2}\vec{l}_1 + \frac{1}{2}\vec{l}_2$$

$$= 5,5\vec{l}_1 + 3,5\vec{l}_2$$

$$= \begin{pmatrix} 5,5 \\ 3,5 \end{pmatrix} \Rightarrow x = \begin{pmatrix} -5,5 \\ -3,5 \end{pmatrix}$$

$$\vec{l}_1 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$$

$$\vec{l}_2 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\vec{x} = \begin{pmatrix} -9 \\ 2 \end{pmatrix}$$

$$\begin{pmatrix} -9 \\ 2 \end{pmatrix} = x_1 \cdot \begin{pmatrix} 1 \\ -1 \end{pmatrix} + x_2 \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$x_1 + x_2 = -9$$

$$-x_1 + x_2 = 2$$

$$2x_2 = -7 \Rightarrow x_2 = -3,5$$

$$2x_1 = -11 \Rightarrow x_1 = -5,5$$

$$x = \begin{pmatrix} -5,5 \\ -3,5 \end{pmatrix}$$

$$d) \quad \vec{b}_1 = \begin{pmatrix} 0 \\ 8 \end{pmatrix} \quad \vec{b}_2 = \begin{pmatrix} 11 \\ -2 \end{pmatrix} \quad \vec{x} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}$$

$$\begin{pmatrix} 6 \\ 4 \end{pmatrix} = x_1 \begin{pmatrix} 0 \\ 8 \end{pmatrix} + x_2 \begin{pmatrix} 11 \\ -2 \end{pmatrix}$$

$$6 = 11x_2 \quad \Rightarrow \quad x_2 = \frac{6}{11}$$

$$4 = 8x_1 - 2x_2$$

$$\Rightarrow 4 = 8x_1 - \frac{12}{11}$$

$$\Leftrightarrow 8x_1 = \frac{44+12}{11} = \frac{56}{11}$$

$$\Leftrightarrow x_1 = \frac{7}{11}$$

$$\Rightarrow x = \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 7/11 \\ 6/11 \end{pmatrix}$$