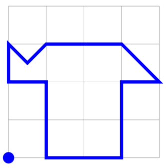
Universidade de Brasília
Departamento de Matemática

Introdução a Álgebra Linear
Lista 1/05 – 1º/2022

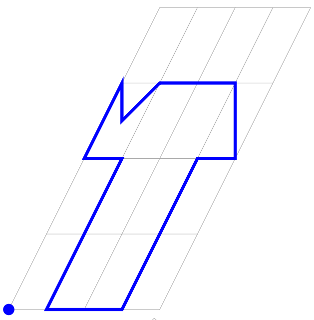
Exercício 1. Sem ficar fazendo muita conta, calcule:

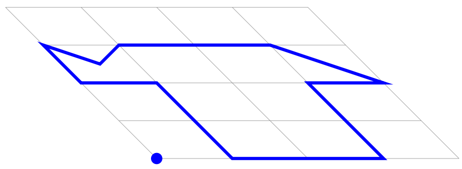
1. $$\left(\left(\begin{bmatrix}1 & 4 & 7\\ 2 & 5 & 8\\ 3 & 6 & 9\end{bmatrix}\begin{bmatrix}-2 & -4 & 9\\ 5 & -5 & -2\\ 3 & -6 & 3\end{bmatrix}\begin{bmatrix}5 & 4 & 0\\ 3 & 2 & 0\\ 9 & 8 & 0\end{bmatrix}\right)\begin{bmatrix}1 & 0 & 0\\ 0 & 0 & 0\\ 0 & 1 & 3\end{bmatrix}\right)\begin{bmatrix}0 & 0 & 0\\ 0 & 1 & 1\\ 1 & 0 & 1\end{bmatrix}$$
2. $$\left(\left(\begin{bmatrix}0 & x & y\\ 0 & 1 & 3\\ 0 & 2 & 4\end{bmatrix}\begin{bmatrix}3 & 7 & 8\\ 0 & -1 & -3\\ 0 & 6 & 8\end{bmatrix}\begin{bmatrix}5 & 6 & 1\\ 0 & 0 & 2\\ 0 & 0 & 3\end{bmatrix}\right)\begin{bmatrix}4 & w & 1\\ 5 & z & 2\\ 0 & 0 & 3\end{bmatrix}\right)\begin{bmatrix}3 & 0 & 0\\ 0 & -5 & 0\\ 0 & 0 & 0\end{bmatrix}$$

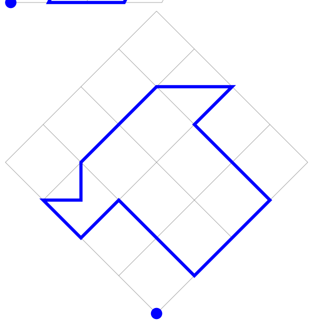
Exercício 2. Se aplicarmos ao desenho

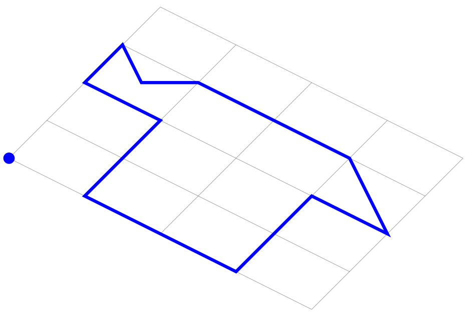


as transformação representada pela matriz $\begin{bmatrix}2 & 1\\ -1 & 1\end{bmatrix}$, obtemos o seguinte desenho.

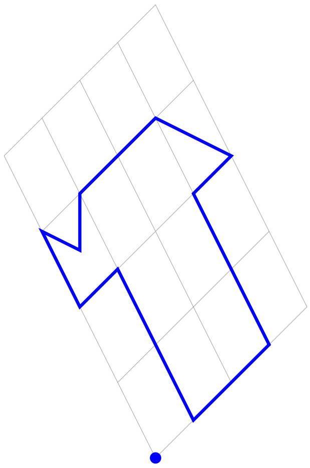
1. 

2. 

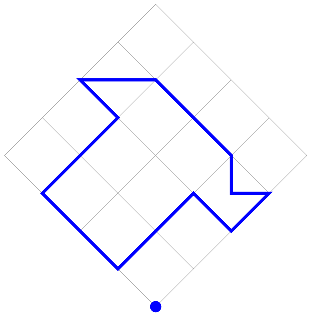
3. 

4. 

5.



6.



Introdução a Álgebra Linear
Lista 1/05 – 1º/2022

Exercício 3. Se

$$M = \begin{bmatrix} \cos\frac{\pi}{3} & -\sin\frac{\pi}{3} \\ \sin\frac{\pi}{3} & \cos\frac{\pi}{3} \end{bmatrix}, \quad N = \begin{bmatrix} \cos\frac{\pi}{2} & \sin\frac{\pi}{2} \\ -\sin\frac{\pi}{2} & \cos\frac{\pi}{2} \end{bmatrix} \quad \text{e} \quad v = \begin{bmatrix} 5 \\ 7 \end{bmatrix},$$

determine o produto

$$NMN^2M^2NMv = \begin{bmatrix} \quad \\ \quad \\ \quad \end{bmatrix}.$$

Exercício 4. Seja M uma matriz tal que

$$M^{-1}\begin{bmatrix} 1 \\ 2 \\ 5 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, \quad M^{-1}\begin{bmatrix} 2 \\ -1 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \quad \text{e} \quad M^{-1}\begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}.$$

Então,

$$M = \begin{bmatrix} 1 & \quad & \quad \\ 2 & \quad & \quad \\ 5 & \quad & \quad \end{bmatrix}.$$

Exercício 5. Para os conjuntos a seguir, julgue (V)erdadeira ou (F)alsa a afirmação *"S é subsepaço de $\mathbb{R}^3$"*.

a ( ) $S = \left\{(x, y, z) \in \mathbb{R}^3 \;\middle|\; 3x + 4z - 5x + 4y + 7 = 7\right\}$.

b ( ) $S = \left\{(x, y, z) \in \mathbb{R}^3 \;\middle|\; x^2 + y^3 = 0\right\}$.

c ( ) $S = \left\{(x, y, z) \in \mathbb{R}^3 \;\middle|\; y + x = 5x\right\}$.

d ( ) $S = \left\{(2x + y, y + z, x + y + z) \;\middle|\; (x, y, z) \in \mathbb{R}^3,\, 3x + 4z - 5x + 4y + 7 = 7\right\}$.