
Exercise 1 Suppose that an invertible linear transformation $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ is such that

$$T\left(\begin{bmatrix} 3 \\ -1 \end{bmatrix}\right) = \begin{bmatrix} 4 \\ -7 \end{bmatrix}; \quad T\left(\begin{bmatrix} 2 \\ 1 \end{bmatrix}\right) = \begin{bmatrix} -5 \\ 4 \end{bmatrix}$$

Find the vector whose image under T is $\begin{bmatrix} 3 \\ -10 \end{bmatrix}$

$$T\left(\begin{bmatrix} \dots \\ \dots \end{bmatrix}\right) = \begin{bmatrix} 3 \\ -10 \end{bmatrix}$$