
Exercise 1 Let $\mathcal{B} = \left\{ \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix} \right\}$ be an ordered basis for $\mathbb{R}^3$. (Mentally verify that $\mathcal{B}$ is a basis of $\mathbb{R}^3$.)

Let $\mathbf{v} = \begin{bmatrix} -1 \\ -3 \\ 2 \end{bmatrix}$ be a vector of $\mathbb{R}^3$ (written with respect to the standard basis of $\mathbb{R}^3$). Find the coordinate vector for $\mathbf{v}$ with respect to $\mathcal{B}$.

$$\begin{bmatrix} \dots \\ \dots \\ \dots \end{bmatrix}$$