

# Assignment 10

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## 1 QUESTION

Let  $\mathbf{T}$  be the linear operator on  $\mathbb{R}^2$  defined by

$$\mathbf{T}(x_1, x_2) = (-x_2, x_1) \quad (1.0.1)$$

What is the matrix of  $\mathbf{T}$  in the standard ordered basis of  $\mathbb{R}^2$ ?

## 2 SOLUTION

$$\mathbf{x} = \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \quad (2.0.1)$$

$$\mathbf{T}(\mathbf{x}) = \mathbf{T}\mathbf{x} \quad (2.0.2)$$

$$\implies \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} -x_2 \\ x_1 \end{pmatrix} \quad (2.0.3)$$

The matrix of  $\mathbf{T}$  in the standard ordered basis from (1.0.1) is

$$\mathbf{T} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \quad (2.0.4)$$