ONE MORE SAMPLE EXAM QUESTION

Let $T: \mathbb{R}^2 \to \mathbb{R}^2$ be the sorting function. Given an input vector $\begin{bmatrix} x \\ y \end{bmatrix}$, the output has x and y in ascending order. So for example, $T\left(\begin{bmatrix} 3 \\ 1 \end{bmatrix}\right) = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$, $T\left(\begin{bmatrix} 2 \\ 5 \end{bmatrix}\right) = \begin{bmatrix} 2 \\ 5 \end{bmatrix}$, and $T\left(\begin{bmatrix} 4 \\ 4 \end{bmatrix}\right) = \begin{bmatrix} 4 \\ 4 \end{bmatrix}$. Is T a linear transformation? If so find the matrix. If not, give an example showing that it is not.