

Worksheet 4 - Due 10/27

1. Find an example of each of the following. If it is not possible, write NOT POSSIBLE.
 - (a) Give an example of 2 linear transformations $S, T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ (this means they are both from \mathbb{R}^3 to \mathbb{R}^3) such that S is onto but $S \circ T$ (this is the function given by $(S \circ T)(x) = S(T(x))$) is not.
 - (b) Give an example of 2 linear transformations $S, T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ such that T is onto but $S \circ T$ is not.
 - (c) Give an example of 2 linear transformations $S, T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ such that S is one-to-one but $S \circ T$ is not.
 - (d) Give an example of 2 linear transformations $S, T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ such that T is one-to-one but $S \circ T$ is not.
2. Give a linear transformation $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ such that $T(1, 1) = (2, 3)$ and $T(-1, 2) = (0, 1)$. Do this using matrix inverses.
3. Find an example of each of the following. If it is not possible, write NOT POSSIBLE.
 - (a) Give an example of a linear transformation $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ that reflects every point about the x -axis.
 - (b) Give an example of a linear transformation $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ that reflects every point about the $x = y$ line.
 - (c) Give an example of a linear transformation $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ that shifts every point up by one unit.