

Winter 2016 Math 217 Section 5
Professor Karen Smith
Quiz 2

1). For each linear transformation T below, find the matrix A such that $T(\vec{x}) = A\vec{x}$. No explanation needed.

a). The map $\mathbb{R}^2 \rightarrow \mathbb{R}^2$ rotating **clockwise** by 90° .

b). The map $\mathbb{R}^2 \rightarrow \mathbb{R}^2$ reflecting over the line $y = x$.

c). The map $f \circ g$, given that g is left multiplication by the matrix $\begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$, and f is a linear map such that $f\left(\begin{bmatrix} 1 \\ -1 \end{bmatrix}\right) = \begin{bmatrix} 7 \\ 9 \end{bmatrix}$ and $f\left(\begin{bmatrix} 2 \\ 3 \end{bmatrix}\right) = \begin{bmatrix} 21 \\ 99 \end{bmatrix}$.

2. Prove, using only the **definition given in class**: If $\mathbb{R}^n \xrightarrow{f} \mathbb{R}^n$ and $\mathbb{R}^n \xrightarrow{g} \mathbb{R}^n$ are linear transformations, then $f \circ g$ is also a linear transformation.

3. For each statement below, decide whether it is True or False. Explain your answer.

a). *If A is a rank one matrix of size 2×4 , then some row is a multiple of another.*

b). *A column vector $\vec{b} \in \mathbb{R}^n$ is a linear combination of column vectors $\vec{v}_1, \vec{v}_2, \dots, \vec{v}_7$ in \mathbb{R}^n if and only if the system $[\vec{v}_1 \ \vec{v}_2 \ \dots \ \vec{v}_7] \vec{x} = \vec{b}$ is consistent.*