Problem Set 2, Math 54-Lec 3, Linear Algebra, Fall 2017

September 6th, 2017

Problem 1. Let $T : \mathbb{R}^n \to \mathbb{R}^m$ be a linear transformation, such that $T(\vec{x}) = B\vec{x}$ for some $m \times n$ matrix B. Show that if A is the standard matrix for T, then $A = B$. [*Hint:* Show that A and B have the same columns.]

Problem 2. Let $S : \mathbb{R}^p \to \mathbb{R}^n$ and $T : \mathbb{R}^n \to \mathbb{R}^m$ be a linear transformations. Show that the mapping $(T \circ S)(\vec{x}) = T(S(\vec{x}))$ is a linear transformation.

Problem 3. Show that if the columns of B are linearly dependent, then so are the columns of AB.