Quiz # 3 **Name:** _____
Date: 15/9/2022
Math 54: Fall 2022

Problem 1 - 2 Points

Compute AB and BA for the following matrices. If the product is not defined explain why not.

$$A = \begin{bmatrix} 2 & 4 \\ 1 & -1 \\ -2 & 1 \end{bmatrix}, \; B = \begin{bmatrix} 2 & 1 \\ 3 & -2 \end{bmatrix}$$

Problem 2 - 4 Points

Consider the following transformation $T : \mathbb{R}^3 \to \mathbb{R}^2$

$$T\left(\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} \right) = \begin{bmatrix} x_1 \\ x_2 - x_3 \end{bmatrix}$$

Show whether this transformation is linear or not. If it is, find the standard matrix A of the transformation T.

Problem 3 - 4 Points

Suppose a linear transformation $T : \mathbb{R}^3 \to \mathbb{R}^3$ is defined by

$$T\left(\begin{bmatrix}1\\0\\0\end{bmatrix}\right) = \begin{bmatrix}1\\-1\\-1\end{bmatrix},\ T\left(\begin{bmatrix}0\\1\\0\end{bmatrix}\right) = \begin{bmatrix}0\\1\\1\end{bmatrix},\ T\left(\begin{bmatrix}0\\0\\1\end{bmatrix}\right) = \begin{bmatrix}0\\1\\0\end{bmatrix}$$

1. Write the standard matrix A of the transformation T. Find A^{-1}.
2. Compute $A^{-1}\begin{bmatrix}1\\-1\\-1\end{bmatrix}$. What do you get?