

Additional Problems Assignment 8

1. Consider the function $T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ defined by:

$$T\left(\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}\right) = \begin{bmatrix} x_2 \\ 0 \\ x_1 + x_2 + x_3 \end{bmatrix}.$$

- (a) Show that T either is or is not a linear transformation.
(b) If T is a linear transformation, find its corresponding matrix A .
2. Consider the function $T : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ defined by:

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

- (a) Show that T either is or is not a linear transformation.
(b) If T is a linear transformation, find its corresponding matrix A .
3. Let T be a function from \mathbb{R}^2 to \mathbb{R}^2 defined by taking a vector \vec{v} and rotating it clockwise by 120° and cutting the length in half.
- (a) Show that T is a linear transformation (Hint:(Use what we did in class together with using exercise 2.1: 45)).
(b) Find the corresponding matrix A for T .