Assignment 10

Matish Singh Tanwar

***Abstract*—This document contains a solution to find whether the given function T from R^2 into R^2 is linear transformation or not.**

Download all latex-tikz codes from

https://github.com/Matish007/Matrix−Theory−EE5609−/tree/master/Assignment_10

1 Problem

Whether the given function T from R^2 into R^2 is linear transformation or not.

$$T\begin{pmatrix}x_1\\x_2\end{pmatrix}=\begin{pmatrix}1+x_1\\x_2\end{pmatrix} \tag{1.0.1}$$

2 SOLUTION

If,

$$T(\alpha+\beta)=T(\alpha)+T(\beta) \tag{2.0.1}$$

(2.0.1) is true for our function T then given function T from R^2 into R^2 is linear transformation,otherwise not.

$$\alpha=\begin{pmatrix}a_1\\a_2\end{pmatrix} \tag{2.0.2}$$

$$\beta=\begin{pmatrix}b_1\\b_2\end{pmatrix} \tag{2.0.3}$$

$$\alpha+\beta=\begin{pmatrix}a_1+b_1\\a_2+b_2\end{pmatrix} \tag{2.0.4}$$

Using (1.0.1) we get,

$$T\begin{pmatrix}a_1+b_1\\a_2+b_2\end{pmatrix}=\begin{pmatrix}1+a_1+b_1\\a_2+b_2\end{pmatrix} \tag{2.0.5}$$

$$T\begin{pmatrix}a_1\\a_2\end{pmatrix}=\begin{pmatrix}1+a_1\\a_2\end{pmatrix} \tag{2.0.6}$$

$$T\begin{pmatrix}b_1\\b_2\end{pmatrix}=\begin{pmatrix}1+b_1\\b_2\end{pmatrix} \tag{2.0.7}$$

Substituting (2.0.6),(2.0.7) in RHS of (2.0.1).We get,

$$\begin{pmatrix}2+a_1+b_1\\a_2+b_2\end{pmatrix} \tag{2.0.8}$$

Comparing (2.0.8) with (2.0.5) we find that they are not equal.
Hence given function T is not a linear transformation.