

Matrix theory Assignment 12

Shivangi Parashar

Since equation (2.0.3) \neq equation (2.0.5). Hence not a linear transformation

Abstract—This document contains the concept of linear transformation.

Download all python codes from

https://github.com/shivangi-975/EE5609-Matrix_Theory/tree/master/Assignment12/Codes

Download latex-tikz codes from

https://github.com/shivangi-975/EE5609-Matrix_Theory/blob/master/Assignment12/Assignment_12.tex

1 PROBLEM

Is the following function T from R_2 into R_2 is linear transformation?

$$T \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} \sin(x_1) \\ x_2 \end{pmatrix}$$

2 SOLUTION

Let, $T : R^2 \rightarrow R^2$ be a function given by:

$$T \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} \sin(x_1) \\ x_2 \end{pmatrix} \quad (2.0.1)$$

Let, $x_1 = x_2 = 0$

$$T \begin{pmatrix} 0 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \quad (2.0.2)$$

Let, $(x_1, x_2) \in R^2$ and $(p_1, q_1) \in R^2$

$$T \begin{pmatrix} x_1 + p_1 \\ x_2 + q_1 \end{pmatrix} = \begin{pmatrix} \sin(x_1 + p_1) \\ x_2 + q_1 \end{pmatrix} \quad (2.0.3)$$

Now,

$$T \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} + T \begin{pmatrix} p_1 \\ q_1 \end{pmatrix} = \begin{pmatrix} \sin(x_1) \\ x_2 \end{pmatrix} + \begin{pmatrix} \sin(p_1) \\ q_1 \end{pmatrix} \quad (2.0.4)$$

$$\Rightarrow \begin{pmatrix} \sin(x_1) + \sin(p_1) \\ x_2 + q_1 \end{pmatrix} \quad (2.0.5)$$