EE5609: Matrix Theory
Assignment-9

Y.Pranaya
AI20MTECH14014

***Abstract*—This document proves the given function is Linear Transformation**

Download the latex-tikz codes from

https://github.com/pranaya14014/EE5609/tree/master/Assignment9

1 PROBLEM

$$\mathbf{T}(x_1, x_2) = (x_2, x_1) \tag{1.0.1}$$

Does function $\mathbf{T}$ from $\mathbb{R}^2$ into $\mathbb{R}^2$ is Linear Transformation.

2 SOLUTION

Let,

$$\alpha, \beta \in \mathbb{R}^2$$

$$\alpha = (x_1, x_2) \tag{2.0.1}$$

$$\beta = (y_1, y_2) \tag{2.0.2}$$

Applying transformation on $\mathbf{T}$ on $(c\alpha + \beta)$ with c being a scalar,

$$\mathbf{T}(c\alpha + \beta) = \mathbf{T}(cx_1 + y_1, cx_2 + y_2) \tag{2.0.3}$$

$$= (cx_1, cx_2) + (y_1, y_2) \tag{2.0.4}$$

$$= c(x_1, x_2) + (y_1, y_2) \tag{2.0.5}$$

$$= c\mathbf{T}(\alpha) + \mathbf{T}(\beta) \tag{2.0.6}$$

Hence from (2.0.6) we can say $\mathbf{T}$ is a Linear Transformation from $\mathbb{R}^2$ to $\mathbb{R}^2$