

# Matrix theory Assignment 12

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**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](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](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

$$T \begin{pmatrix} \pi \\ 0 \end{pmatrix} = \begin{pmatrix} \sin(\pi) \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \quad (2.0.1)$$

$$2T \begin{pmatrix} \frac{\pi}{2} \\ 0 \end{pmatrix} = 2 \begin{pmatrix} \sin(\frac{\pi}{2}) \\ 0 \end{pmatrix} = \begin{pmatrix} 2 \\ 0 \end{pmatrix} \quad (2.0.2)$$

Since equation (2.0.1)  $\neq$  equation (2.0.2). Hence not a linear transformation