

Assignment 18

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The link to the solution is

<https://github.com/Adarsh1310/EE5609>

Abstract—This documents solves a problem based on **Linear Transformation**.

1 PROBLEM

Describe explicitly the linear transformation T from \mathbb{F}^2 into \mathbb{F}^2 such that $T\epsilon_1 = (a, b), T\epsilon_2 = (c, d)$.

2 SOLUTION

We are given a linear transformation,

$$T : \mathbb{F}^2 \rightarrow \mathbb{F}^2 \quad (2.0.1)$$

This means that T takes a two dimensional vector and returns another vector in two dimensional space after performing some linear transformation.

$$T(\epsilon_1) = \mathbf{A} \epsilon_1 \quad (2.0.2)$$

$$T(\epsilon_2) = \mathbf{A} \epsilon_2 \quad (2.0.3)$$

Where \mathbf{A} is a matrix that performs the linear transformation. Now, let's assume ϵ_1 and ϵ_2 as linearly independent. So the linear transformation T for any vector \mathbf{V} in two dimensional space will be,

$$T(\mathbf{V}) = \begin{pmatrix} c_1 & c_2 \end{pmatrix} \begin{pmatrix} T(\epsilon_1) \\ T(\epsilon_2) \end{pmatrix} \quad (2.0.4)$$

$$= c_1 \mathbf{A} \epsilon_1 + c_2 \mathbf{A} \epsilon_2 \quad (2.0.5)$$