

Assignment 11

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The link to the solution is

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

Abstract—This documents show a method to perform row exchange using elementary row operations.

Now adding row 2 to row 1.

$$\begin{pmatrix} a_2 \\ -a_1 \\ \dots \\ a_n \end{pmatrix} \quad (2.0.5)$$

Now, multiplying row 2 by -1.

$$\begin{pmatrix} a_2 \\ a_1 \\ \dots \\ a_n \end{pmatrix} \quad (2.0.6)$$

1 PROBLEM

Prove that the interchange of two rows of a matrix can be accomplished by a finite sequence of elementary row operations of the other two types.

Hence, (2.0.2) was obtained from other two operations.

2 SOLUTION

Let us assume a matrix \mathbf{M} having row vectors as $\mathbf{a}_1, \mathbf{a}_2 \dots \mathbf{a}_n$.

$$\mathbf{M} = \begin{pmatrix} a_1 \\ a_2 \\ \dots \\ a_n \end{pmatrix} \quad (2.0.1)$$

Let's exchange row \mathbf{a}_1 and \mathbf{a}_2 .

$$\begin{pmatrix} a_2 \\ a_1 \\ \dots \\ a_n \end{pmatrix} \quad (2.0.2)$$

Now, to prove that same matrix can be obtained by row operations of other two types, we will first add row 1 and row 2.

$$\begin{pmatrix} a_1 + a_2 \\ a_2 \\ \dots \\ a_n \end{pmatrix} \quad (2.0.3)$$

Now, subtract row 1 from row 2.

$$\begin{pmatrix} a_1 + a_2 \\ -a_1 \\ \dots \\ a_n \end{pmatrix} \quad (2.0.4)$$