Assignment 2

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Download all python codes from

https://github.com/neharani289/ee14014/Assignment2/codes

and latex-tikz codes from

https://github.com/neharani289/ee14014/Assignment2

1 Problem Statement

Using elementary transformation find inverse of the matrices,if it exist

$$\begin{pmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{pmatrix} \tag{1.0.1}$$

$$\tag{1.0.2}$$

2 Solution

Let matrix ,

$$A= \begin{pmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{pmatrix} \tag{2.0.1}$$

The corresponding augmented matrix is

$$\left(\begin{array}{ccc|ccc} 2 & -3 & 3 & 1 & 0 & 0 \\ 2 & 2 & 3 & 0 & 1 & 0 \\ 3 & -2 & 2 & 0 & 0 & 1 \end{array}\right) \tag{2.0.2}$$

We use the Guass Jordan Elimination method as:

$$\left(\begin{array}{ccc|ccc} 2 & -3 & 3 & 1 & 0 & 0 \\ 2 & 2 & 3 & 0 & 1 & 0 \\ 3 & -2 & 2 & 0 & 0 & 1 \end{array}\right) \tag{2.0.3}$$

$$\xleftrightarrow{C_2 \leftarrow C_2 + C_1} \left(\begin{array}{ccc|ccc} 2 & 0 & 3 & 1 & 0 & 0 \\ 2 & 5 & 3 & 0 & 1 & 0 \\ 3 & 0 & 2 & 0 & 1 & 1 \end{array}\right) \tag{2.0.4}$$

$$\xleftrightarrow{C_1 \leftarrow C_3 - C_1} \left(\begin{array}{ccc|ccc} 1 & 0 & 3 & -1 & 0 & 0 \\ 1 & 5 & 3 & 0 & 1 & 0 \\ -1 & 0 & 2 & 1 & 1 & 1 \end{array}\right) \tag{2.0.5}$$

$$\xleftrightarrow{C_3 \leftarrow C_3 - 3C_1} \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -1 & 0 & 3 \\ 1 & 5 & 0 & 0 & 1 & 0 \\ -1 & 0 & 5 & 1 & 1 & -2 \end{array}\right) \tag{2.0.6}$$

$$\xleftrightarrow{C_3 \leftarrow \frac{1}{5} C_3} \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -1 & 0 & 3/5 \\ 0 & 5 & 0 & 0 & 1 & 0 \\ -1 & 0 & 1 & 1 & 1 & -2/5 \end{array}\right) \tag{2.0.7}$$

$$\xleftrightarrow{C_2 \leftarrow \frac{1}{5} C_2} \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -1 & 0 & 3/5 \\ 0 & 1 & 0 & 0 & 1/5 & 0 \\ -1 & 0 & 1 & 1 & 1/5 & -2/5 \end{array}\right) \tag{2.0.8}$$

$$\xleftrightarrow{C_1 \leftarrow C_1 - C_2} \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -1 & 0 & 3/5 \\ 0 & 1 & 0 & -1/5 & 1/5 & 0 \\ -1 & 0 & 1 & 4/5 & 1/5 & -2/5 \end{array}\right) \tag{2.0.9}$$

$$\xleftrightarrow{C_1 \leftarrow C_1 + C_3} \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -2/5 & 0 & 3/5 \\ 0 & 1 & 0 & -1/5 & 1/5 & 0 \\ 0 & 0 & 1 & 2/5 & 1/5 & -2/5 \end{array}\right) \tag{2.0.10}$$

$$\mathbf{A^{-1}} = \begin{pmatrix} -2/5 & 0 & 3/5 \\ -1/5 & 1/5 & 0 \\ 2/5 & 1/5 & -2/5 \end{pmatrix} \tag{2.0.11}$$