Assignment 2

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Download all python codes from

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https://github.com/neharani289/ee14014/
    Assignment2/codes
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and latex-tikz codes from

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

(Section 3.9) 59.Using elementary transformation find inverse of the matrices,if it exist $\begin{pmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{pmatrix}$

2 Solution

Let's name the ,matrices as:- $\mathbf{A} = \begin{pmatrix} 2 & -3 & 3 \\ 2 & 2 & 2 \\ 3 & -2 & 2 \end{pmatrix}$

We know $\mathbf{A} = \mathbf{AI}$

$$\begin{pmatrix} 2 & -3 & 3 \\ 2 & 2 & 2 \\ 3 & -2 & 2 \end{pmatrix} = \mathbf{A}\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \end{pmatrix} \tag{2.0.1}$$

Applying transformation on both sides;

$$C_2 \to C_2 + C_3 \tag{2.0.2}$$

$$\begin{pmatrix} 2 & 0 & 3 \\ 2 & 5 & 3 \\ 3 & 0 & 2 \end{pmatrix} = \mathbf{A}\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{pmatrix} \tag{2.0.3}$$

$$C_1 \to C_3 - C_1 \tag{2.0.4}$$

$$\begin{pmatrix} 1 & 0 & 3 \\ 1 & 5 & 3 \\ -1 & 0 & 2 \end{pmatrix} = \mathbf{A}\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 1 & 1 \end{pmatrix} \tag{2.0.5}$$

$$C_3 \to C_3 - 3C_1 \tag{2.0.6}$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 1 & 5 & 0 \\ -1 & 0 & 5 \end{pmatrix} = \mathbf{A}\begin{pmatrix} -1 & 0 & 3 \\ 0 & 1 & 0 \\ 1 & 1 & -2 \end{pmatrix} \tag{2.0.7}$$

$$C_3 \to C_2/5 \text{ and } C_3 \to C_3/5 \tag{2.0.8}$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -1 & 0 & 1 \end{pmatrix} = \mathbf{A}\begin{pmatrix} -1 & 0 & 3/5 \\ -1/5 & 1/5 & 0 \\ 4/5 & 1/5 & -2/5 \end{pmatrix} \tag{2.0.9}$$

$$C_3 \to C_1 + C_3 \tag{2.0.10}$$

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

this is in the form of

$$I = \mathbf{AA^{-1}} \tag{2.0.12}$$

$$\mathbf{A^{-1}} = \begin{pmatrix} -2/5 & 0 & 3/5 \\ -1/5 & 1/5 & 0 \\ 2/5 & 1/5 & -2/5 \end{pmatrix} \tag{2.0.13}$$