Problem.5:- Inverse of a Matrix by Gauss Jordon Method, using Gauss Jordon method, find the inverse of the.

$$A = \begin{pmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{pmatrix}.$$

The augmented Matrix is :-

$$[A/I] = \left[\begin{array}{ccc|ccc} 1 & 1 & 3 & 1 & 0 & 0 \\ 1 & 3 & -3 & 0 & 1 & 0 \\ -2 & -4 & -4 & 0 & 0 & 1 \end{array}\right].$$

Fix the 1^{st} row:-

$$= \left[\begin{array}{ccc|ccc} 1 & 1 & 3 & 1 & 0 & 0 \\ 0 & 2 & -6 & -1 & 1 & 0 \\ 0 & -2 & +2 & 2 & 0 & 1 \end{array}\right] \begin{array}{l} R_2 \to R_2 - R_1 \\ R_3 \to R_3 + 2R_1 \end{array}$$

Fix the 2^{nd} row:-

$$= \left[\begin{array}{ccc|ccc} 2 & 0 & 12 & 3 & -1 & 0 \\ 0 & 2 & -6 & -1 & 1 & 0 \\ 0 & 0 & -4 & 1 & 1 & 1 \end{array}\right] \begin{array}{l} R_1 \to 2R_1 - R_2 \\ R_3 \to R_3 + R_2. \end{array}$$

Fix the 3rd row;..

$$= \left[\begin{array}{ccc|ccc} 2 & 0 & 0 & 6 & 2 & 3 \\ 0 & 8 & 0 & -10 & -2 & -6 \\ 0 & 0 & -4 & 1 & 1 & 1 \end{array}\right] \quad \begin{array}{l} R_1 \to R_1 + 3R_3. \\ R_2 \to 4R_2 - 6R_3. \end{array}$$

To get the Identity matrix;..

$$\left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 3 & 1 & 3/2 \\ 0 & 1 & 0 & -10/8 & -2/8 & -6/8 \\ 0 & 0 & 1 & -1/4 & -1/4 & -1/4 \end{array}\right] \quad \begin{array}{l} R_1 \to R_1/2 \\ R_2 \to R_2/8 \\ R_3 \to R_3/_{-4}. \end{array}$$

$$\Rightarrow \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 3 & 1 & 3/2 \\ 0 & 1 & 0 & -5/4 & -1/4 & -3/4 \\ 0 & 0 & 1 & -1/4 & -1/4 & -1/4 \end{array}\right].$$

$= A^{-1}$.

$$\Rightarrow [I/A^{-1}].$$

$$\therefore A^{-1} = \begin{bmatrix} 3 & 1 & 3/2 \\ -5/4 & -1/4 & -3/4 \\ -1/4 & -1/4 & -1/4 \end{bmatrix}.$$

Problem. 6 :- Using Gauss Jordon method, find the inverse of $A = \begin{pmatrix} 2 & 2 & 3 \\ 2 & 1 & 1 \\ 1 & 3 & 5 \end{pmatrix}$.

Note: [Mode → Mat
shift 4 → Matrices
A B C
No 1
→ x^{-1} =
row: 3 =
colum: 3 =
display :- Mat 11]

The Augmented Matrix is;..

$$[A/I] = \left[\begin{array}{ccc|ccc} 2 & 2 & 3 & 1 & 0 & 0 \\ 2 & 1 & 1 & 0 & 1 & 0 \\ 1 & 3 & 5 & 0 & 0 & 1 \end{array}\right].$$

Fix the 1st row;.

$$= \left[\begin{array}{ccc|ccc} 2 & 2 & 3 & 1 & 0 & 0 \\ 0 & -1 & -2 & -1 & 1 & 0 \\ 0 & 4 & 7 & -1 & 0 & 2 \end{array}\right]. \quad \begin{array}{l} R_2 \to R_2 - R_1 \\ R_3 \to 2R_3 - R_1 \end{array}$$

Fix the 2nd row;..

$$= \left[\begin{array}{ccc|ccc} 2 & 0 & -1 & -1 & 2 & 0 \\ 0 & -1 & -2 & -1 & 1 & 0 \\ 0 & 0 & -1 & -5 & 4 & 2 \end{array}\right] \quad \begin{array}{l} R_1 \to R_1 + 2R_2 \\ R_3 \to R_3 + 4R_2 \end{array}$$

Fix the 3rd row;..

$$\Rightarrow \left[\begin{array}{ccc|ccc} 2 & 0 & 0 & 4 & -2 & -2 \\ 0 & -1 & 0 & 9 & -7 & -4 \\ 0 & 0 & -1 & -5 & 4 & 2 \end{array}\right] \begin{array}{l} R_1 \to R_1 - R_3 \\ R_2 \to R_2 - 2R_3 \end{array}$$

$$\Rightarrow \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 2 & -1 & -1 \\ 0 & 1 & 0 & -9 & 7 & 4 \\ 0 & 0 & 1 & 5 & -4 & -2 \end{array}\right] \begin{array}{l} R_1 \to R_1/2 \\ R_2 \to R_2/_{-1} \\ R_3 \to R_3/_{-1} \end{array}$$

A^{-1}.

$$(A/I) = (I/A^{-1})$$

$$\therefore A^{-1} = \begin{bmatrix} 2 & -1 & -1 \\ -9 & 7 & 4 \\ 5 & -4 & -2 \end{bmatrix} //.$$

Problem. 7 : Using Gauss Jordon method. find the inverse of $A = \begin{pmatrix} 2 & 1 & 1 \\ 3 & 2 & 3 \\ 1 & 4 & 9 \end{pmatrix}$

The Augmented Matrix is :

$$(A/I) = \left(\begin{array}{ccc|ccc} 2 & 1 & 1 & 1 & 0 & 0 \\ 3 & 2 & 3 & 0 & 1 & 0 \\ 1 & 4 & 9 & 0 & 0 & 1 \end{array}\right)$$

Fix the 1st row;..

$$= \left(\begin{array}{ccc|ccc} 2 & 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 3 & -3 & 2 & 0 \\ 0 & 7 & 17 & -1 & 0 & 2 \end{array}\right) \begin{array}{l} R_2 \to 2R_2 - 3R_1 \\ R_3 \to 2R_3 - R_1 \end{array}$$

Fix the 2nd row;..

$$= \left(\begin{array}{ccc|ccc} 2 & 0 & -2 & 4 & -2 & 0 \\ 0 & 1 & 3 & -3 & 2 & 0 \\ 0 & 0 & -4 & 20 & -14 & 2 \end{array}\right) \begin{array}{l} R_1 \to R_1 - R_2 \\ R_3 \to R_3 - 7R_2 \end{array}$$

Fix the 3rd row :-

$$= \left(\begin{array}{ccc|ccc} 4 & 0 & 0 & -12 & 10 & -2 \\ 0 & 4 & 0 & -72 & 50 & -6 \\ 0 & 0 & -4 & 20 & -14 & 2 \end{array}\right) \begin{array}{l} R_1 \to 2R_1 - R_3 . \\ R_2 \to 4R_2 - 3R_3 . \end{array}$$

$$\Rightarrow \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -12/4 & 10/4 & -2/4 \\ 0 & 1 & 0 & -72/4 & 50/4 & -6/4 \\ 0 & 0 & 1 & -20/4 & 14/4 & 2/4 \end{array}\right) \begin{array}{l} R_1 \to R_1/4 \\ R_2 \to R_2/4 \\ R_3 \to R_3/-4 . \end{array}$$

$$A^{-1} \Rightarrow \begin{pmatrix} -3 & 5/2 & -1/2 \\ -3/1 & 25/2 & -3/2 \\ -5/1 & 7/2 & 1/2 \end{pmatrix} .$$