

Name = Ijaz Khan

ID = 16764

Program = SE

Section = B

Paper = Linear Algebra

Semester = Second.

Ijaz Khan

ID = 16764

Page (1)

Q No 1

$$\begin{bmatrix} 1 & 103 & 3 & 0 & 5 \\ 0 & 1 & -103 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 103 \end{bmatrix}$$

Sol \Rightarrow

Let suppose

$$ID = 16764$$

$$ID_3 = 7$$

$$ID_{last} = 4$$

Inverse of ID_{last} is =
Now putting value

$$\begin{bmatrix} 1 & 7 & 3 & 0 & 5 \\ 0 & 1 & -4 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 4 \end{bmatrix}$$

Ans (1)

$$\sim R \begin{bmatrix} 1 & 7 & 0 & 15 \\ 0 & 1 & 0 & 7 \\ 0 & 0 & 1 & -6 \\ 0 & 0 & 0 & 4 \end{bmatrix} \begin{array}{l} R_1 - 3R_3 \\ R_2 + 5R_3 \end{array}$$

Ijaz Khan

ID = 16764

Page (2)

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 45 \\ 0 & 1 & 0 & 0 & 21 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 4 \end{bmatrix} \quad R_1 - 3R_2$$

$$x_1 = 45$$

$$x_2 = 21$$

$$x_3 = -6$$

$$x_4 = 4$$

Q No 2

Part (A)

Solution

$$\begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 2 & -5 & -1 \end{bmatrix} \quad \begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 0 & 3 & -5 \end{bmatrix}$$

If we know that the first two rows in both matrix are same. Therefore only the 3rd row are different of both matrix.

Ijaz Khan

ID = 16764

Page (3)

$$\text{So } \begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 2 & -5 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 0 & 3 & -5 \end{bmatrix} R_3 - 2R_2$$

$$\text{And } \begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 0 & 3 & -1 \end{bmatrix} R_3 - 2R_2$$

In first matrix we multiply 2 with row second & the subtract it from third row which the same result like matrix second.

(B) Part

a)

$$\begin{bmatrix} e & 0 & 0 & 0 \\ 0 & \pi & 0 & 0 \\ 0 & 0 & -\pi & 0 \\ 0 & 0 & 0 & e \end{bmatrix} \text{ is in echelon form b/c all zero above \& below the entries.}$$

Ijaz Khan

ID = 16764

Page (1)

(B) $\begin{bmatrix} 1 & 0 & \pi \\ 0 & 1 & e \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ It is not in echelon form.
It is reduce echelon form.

c) It is an echelon form
not reduce echelon form.

d) Is also echelon form.

Q No (3)

(A) Part \Rightarrow Differences b/w echelon & reduce echelon form.

The echelon form of a matrix is not unique, ^{which} ~~while~~ means there are infinite answers possible when you perform row reduction.

Reduce row echelon form is at the other end of the spectrum. It is unique, which means row-reduction on a matrix will produce the same

Ijaz Khan

ID. = 16764

Page (5)

answers no matter how
you perform the same
row operation. \therefore

Uses = The reduce row
echelon form is
used to solve the
system of linear equation

Example =
$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 5 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 9 \end{array} \right]$$

Part BSolution \Rightarrow Let \sim ID = 16764

$$\text{ID}_3 = 7$$

$$\text{ID}_2 = 6$$

$$\text{1st last} = 14$$

Now putting values.

$$\begin{bmatrix} 1 & 6 & 8 \\ 2 & 8 & -1 \\ 7 & 0 & 0 \\ 1 & -4 & 14 \end{bmatrix}$$

$$\underline{R_1} \begin{bmatrix} 1 & 6 & 8 \\ 0 & 6 & -3 \\ 7 & 0 & 0 \\ 1 & -4 & 14 \end{bmatrix} \quad \begin{array}{l} 2 \text{ subtract from} \\ : 2^{\text{nd}} \text{ row} \\ \text{Now 6 divid to} \\ \text{row}_2 \end{array}$$

$$\underline{R_1} \begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & -\frac{1}{2} \\ 7 & 0 & 0 \\ 1 & -4 & 14 \end{bmatrix} \quad \begin{array}{l} \text{changing Row 3 \&} \\ \text{row 4} \end{array}$$

$$\underline{R_1} \begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & -\frac{1}{2} \\ 1 & -4 & 14 \\ 7 & 0 & 0 \end{bmatrix}$$

Ijaz Khan

ID = 16764

Page (7)

Now $\begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & -\frac{1}{2} \\ 5 & 0 & 18 \\ 7 & 0 & 0 \end{bmatrix}$ Add 4 to row₃

$\sim R$ $\begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & -\frac{1}{2} \\ 0 & 0 & 18 \\ 7 & 0 & 0 \end{bmatrix}$ subtract 5 to row₃

$\sim R$ $\begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & -\frac{1}{2} \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$ Subtract 7 to row₄ & divided 18 from row₃

Hence they are echelon form.