Date 15/6/2020

Page = 01 ID # 12724. Paper mid term Subject = Linear Algebra

Q1 = Given data :-

$$\begin{bmatrix} 1 & ID3 & 3 & 0 & 5 \\ 0 & 1 & -I\,Last & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & ID3 \end{bmatrix}$$

- Requerried :

Solving the system : ?

- Solution :-

$$\begin{bmatrix} 1 & ID3 & 3 & 0 & 5 \\ 0 & 1 & -ID\cdot Last & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & ID3 \end{bmatrix}$$

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

$$\Rightarrow \left[\begin{array}{cccc|c} 1 & 3 & 3 & 0 & 5 \\ 0 & 1 & -4 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 3 \end{array}\right] \quad \because \text{opperation. } -3R_3 + R_1$$

The matrix is in echelon form

$$\Rightarrow \left[\begin{array}{cccc|c} 1 & 3 & 0 & 0 & 5 \\ 0 & 1 & -4 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 3 \end{array}\right] \; 3R_3 + R_2$$

$$\Rightarrow \left[\begin{array}{cccc|c} 1 & 3 & 0 & 0 & 5 \\ 0 & 1 & 0 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 3 \end{array}\right] \; -3R_2 + R_1$$

$x_1 = 5$
$x_2 = 7$
$x_3 = -6$
$x_4 = 3$

Date: 15/6/2020 mid term exam

Page: 05 ID# 12724 Page: Linear algebra

Q3 (b) Find an echelon form using ID digits

$$\begin{bmatrix} 1 & 1D2 & 8 \\ 2 & 8 & -1 \\ -1D3 & 0 & 0 \\ 1 & -4 & ID\text{-}first\text{-}last \end{bmatrix}$$

$$\sim \begin{bmatrix} 1 & 2 & 8 \\ 2 & 8 & -1 \\ -7 & 0 & 0 \\ 1 & -4 & 14 \end{bmatrix} -2R_1 + R_2$$

$$\sim \begin{bmatrix} 1 & 2 & 8 \\ 0 & -4 & -17 \\ 0 & 18 & 24 \\ 1 & -4 & 14 \end{bmatrix} -1R_1 + R_4$$

$$\begin{bmatrix} 1 & 2 & 8 \\ 0 & -4 & -17 \\ 0 & 18 & 24 \\ 0 & -10 & 5 \end{bmatrix}$$ xing $R_2$ by $\frac{-1}{4}$

$$\begin{bmatrix} 1 & 2 & 8 \\ 0 & 1 & 17/4 \\ 0 & 18 & 24 \\ 0 & -10 & 5 \end{bmatrix} -18R_2 + R_3$$

$$\begin{bmatrix} 1 & 2 & 8 \\ 0 & 1 & 17/4 \\ 0 & 0 & 24 \ 4/4 \\ 0 & -10 & 5 \end{bmatrix} 10R_2 + R_4$$

$$\begin{bmatrix} 1 & 2 & 8 \\ 0 & 1 & 17/4 \\ 0 & 0 & 1 \\ 0 & 0 & 17 \ 5/4 \end{bmatrix}$$ xing $R_3$ by $-4/$

Name:- Farhan Shah
Date- 15/6/2020

exam mid term

Page = 04

ID # 12724

Paper - Linear algebra

Q2 (b) part (c)

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

Sol:-

$$\begin{bmatrix} 5 & \textcircled{0} & \textcircled{0} & 7 \\ 0 & \textcircled{1} & 0 & 5 \\ 0 & 0 & \textcircled{1} & 4 \end{bmatrix}$$

This matrix echelon form because it satisfies the fourth condition that is in a collumn that contain the leading entry 1 element are zero.

part (d)

$$\begin{bmatrix} 1 & 0 & 0 & 7 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 4 \end{bmatrix}$$

Sol:-

$$\begin{bmatrix} \textcircled{1} & 0 & 0 & 7 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & \textcircled{1} & 4 \end{bmatrix}$$

This matrix is in echelon form because it satisfies the 4th condition that is in collumn that contain the leading entry 1 row all the other elements are zero.

Q2 (b) Given below are some matrix find whether these are in the form written in front of them are not. explain in your own words

Part (a)
$$\begin{bmatrix} e & 0 & 0 & 0 \\ 0 & \pi & 0 & 0 \\ 0 & 0 & -\pi & 0 \\ 0 & 0 & 0 & e \end{bmatrix}$$

The matrix is not in echlon form because a matrix to should contain the entries either in decimals or in fractions.

Part (b)
$$\begin{bmatrix} 1 & 0 & \pi \\ 0 & 1 & e \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \Rightarrow \begin{bmatrix} 1 & 0 & \pi \\ 0 & 1 & e \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

These are echlon form, a matrix is said to be in echlon form if

(i) the first non-zero element in each row is called its leading entry is 1

(ii) In any two successive row (i) and $(i+1)$ that do not consist entirely of zeros the leading element.

Date = 15/6/2020

Page = 02 ID# 12724 Paper = Linear Algebra

$$1x_1 + 0x_2 + 0x_3 + 0x_4 = 5$$

$$0x_1 + 1x_2 + 0x_3 + 0x_4 = 7$$

$$0x_1 + 0x_2 + 1x_3 + 0x_4 = 6$$

$$0x_1 + 0x_2 + 0x_3 + 1x_4 = 3$$

Ans

Q2 (a) Find the elementry row operation that transfor 1st matrix into 2nd and reverse row operation?

Sol:- $A = \begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 2 & -5 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 0 & 3 & -5 \end{bmatrix}$

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

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

Name:- Farhan Shah

Page=06 ID# 12728

mid exam ↓ Linear algebra

$$\frac{-175}{4} \cdot R_3 + R_4$$

$$\Rightarrow \begin{bmatrix} 1 & 2 & 8 \\ 0 & 1 & 17/4 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$ Result.

Ans.

Q3 (A) The row echelon form is used to solve the system of linear equation

Give one example:-

Sol (A):-

Difference b/w row echelon form and reduced row echelon form:

The matrix in row echelon form meets the following requirements

(i) The first non-zero number form the left is always to the right of the first non-zero number in the row.

(ii) Row consisting of all zero are at the bottoms of the matrix.

For example $\begin{bmatrix} 1 & a_0 & a_1 & a_2 & a_3 \\ 0 & 0 & 2 & a_4 & a_5 \\ 0 & 0 & 0 & 1 & a_6 \end{bmatrix}$

Date: 15/6/2020

Name = Farhan Shah | mid exam

Page: 7

ID# 18724 | Linear Algebra

(iii) It is in row echelon form

(iv) The leading entry in each row is a 1 (caused a leading 1)

Each column containing a leading 1 has zero in all its other.

For example: $\begin{bmatrix} 1 & 0 & a_1 & 0 & b_1 \\ 0 & 1 & a_2 & 0 & b_2 \\ 0 & 0 & 0 & 1 & b_3 \end{bmatrix}$.

Practical use of reduce Row echelon form:

Reduce row echelon form is a type of matrix used to solve system of linear equation it has fair main required which we can take before.

It is used To Solve.

End.