ID: 15815

Name: Ahmed Junaid

Subject: Linear Algebra

BS-SE 2nd Semester

Major: BS(SE)

Date: 23/4/2020

NEXT PAGE:>

ID = 15815 Linear Algebra

Name: Ahmed Junaid BS(SE)

Question 1 Answer:

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

· Puting values 15815 which is My ID.

$$\begin{bmatrix} 1 & 8 & 3 & 0 & 5 \\ 0 & 1 & -5 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 8 \end{bmatrix}$$

$\underset{\sim}{R}$ = we will add 5 times of Row 3 to Row 2

$$\underset{\sim}{R} = \begin{bmatrix} 1 & 8 & 3 & 0 & 5 \\ 0+0 & 1+0 & -5+5 & 0+0 & 7+(-30) \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 8 \end{bmatrix} \begin{array}{l} \\ R_2 + \\ 5R_3 \\ \\ \end{array}$$

Hence

$$\begin{bmatrix} 1 & 8 & 3 & 0 & 5 \\ 0 & 1 & 0 & 0 & -77 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 8 \end{bmatrix}$$

ID: 15815 Linear Algebra

Name Ahmed Junaid

Question 2 Answer.

There are 2 operation ~~one~~ first one is from first matrix to second and reverse:

(1)

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

Using elementary row operation on row 3 by substracting 2 times of row 2

$$\overset{R}{\sim} \begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 2-2 & -5-(-8) & -1-4 \end{bmatrix} R_3 - 2R_2$$

So this becomes:

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

(2)

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

ID: 15815 L. Algebra

(2)

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

Now reversing the process:
using elementary row operation on row 3 by adding $2R_2$ to R_3

$$\sim \begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0+0 & 0+2 & 3+(-8) & -5+4 \end{bmatrix} R_3 + 2R_2$$

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

Q_2 (b)

a: $\begin{bmatrix} e & 0 & 0 & 0 \\ 0 & \pi & 0 & 0 \\ 0 & 0 & -\pi & 0 \\ 0 & 0 & 0 & e \end{bmatrix}$ = is echelon form

Answer: No, As all the entries above and below the diagnal element are zero which is the case of Redure enchelon form an not echelon.

Q2 b) $\begin{bmatrix} 1 & 0 & \pi \\ 0 & 1 & e \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ is echelon form.

Answer. yes, because All the element below diagnal are zero.

c) $\begin{bmatrix} 5 & 0 & 0 & 7 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 4 \end{bmatrix}$ is reduce echelon

Answer: Yes, because all the enteris of diagnal are zero

d) $\begin{bmatrix} 1 & 0 & 0 & 7 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 4 \end{bmatrix}$ is in reduce echelon

Answer: No!, because all the element of Row 2 is zero.

Question 3 Next Page.

ID ~~##~~ 15815 L. Algebra

Question 3

In row echelon form only all the element below the diagonal is zero while above elements are non-zero

In reduce row echelon form all the element below and above the diagonal are zero

With the help of reduce echelon form find out the values of variables used in the system of equation, for example

$2x + 5y + 3z = 4$
$9x + 3y + 2z = -5$ by solving this
$x + 7y - 6z = 1$ we get

$$\begin{bmatrix} 2 \\ -5 \\ 6 \end{bmatrix}$$

Using reduce echelon

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & -5 \\ 0 & 0 & 1 & 6 \end{bmatrix}$$ here we can see clearly

$x = 2,\ y = -5,\ z = 6$

Question 3(b) Putting in the value of ID

$$\begin{bmatrix} 1 & 5 & 8 \\ 2 & 8 & -1 \\ -8 & 0 & 0 \\ 1 & -4 & 15 \end{bmatrix}$$

Now using Row operation on Row 2, 3, 4 by substracting $2R_1$ from R_2
by adding $8R_1$ in R_3
by substracting R_1 to R_4

$$\overset{R}{\rightsquigarrow} \begin{bmatrix} 1 & 5 & 8 \\ 2-2 & 8-10 & -1-15 \\ -8+8 & 0+40 & 0+64 \\ 1-1 & -4-5 & 15-8 \end{bmatrix} \begin{matrix} \\ R_2 - 2R_1 \\ R_3 + 8R_1 \\ \\ \end{matrix}$$

we get:

$$\overset{R}{\rightsquigarrow} \begin{bmatrix} 1 & 5 & 8 \\ 0 & -2 & -17 \\ 0 & 40 & 64 \\ 0 & -9 & 7 \end{bmatrix}$$

Now using Row operation on R_3 by adding $20 R_2$

$$\overset{R}{\rightsquigarrow} \begin{bmatrix} 1 & 5 & 8 \\ 0 & -2 & -17 \\ 0 & 40-40 & 64-(-340) \\ 0 & -9 & 7 \end{bmatrix} \begin{matrix} \\ \\ R_3 + 20R_2 \\ \\ \end{matrix}$$

Q_3 (b) continues:

we get:

$$\sim R \begin{bmatrix} 1 & 5 & 8 \\ 0 & -2 & -17 \\ 0 & 0 & 404 \\ 0 & -9 & 7 \end{bmatrix}$$

Now using Row operation on ~~R_4~~ 2 times of Row 4 Minus 9 times R_2.

$$\sim R \begin{bmatrix} 1 & 5 & 8 \\ 0 & -2 & -17 \\ 0 & 0 & 404 \\ 0-0 & -18-18 & 14-(-153) \end{bmatrix} 2R_4 - 9R_2$$

$$\sim R \begin{bmatrix} 1 & 5 & 8 \\ 0 & -2 & -17 \\ 0 & 0 & 404 \\ 0 & 0 & 167 \end{bmatrix}$$

: Now last step multiply R_4 wit 404 and multiply R_3 with 167 and minus them

$$\sim R \begin{bmatrix} 1 & 5 & 8 \\ 0 & -2 & -17 \\ 0 & 0 & 404 \\ 0 & 0 & 67468-67468 \end{bmatrix} 404R_4 - 167R_3$$

hence: $\begin{bmatrix} 1 & 5 & 8 \\ 0 & -2 & -17 \\ 0 & 0 & 404 \\ 0 & 0 & 0 \end{bmatrix}$ echelon form