Laden ID # 16268 ID - 3 = 7, ID-last = 8

Q (1):

Answer:

$$\begin{bmatrix} 1 & ID-3 & 3 & 0 & 5 \\ 0 & 1 & ID\text{-}last & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & ID-3 \end{bmatrix}$$

$$\sim \left[\begin{array}{cccc|c} 1 & 2 & 3 & 0 & 5 \\ 0 & 1 & -8 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 7 \end{array}\right] \quad -3R_3+R_1$$

Comment: As we can see, the matrix is already in echlon form.

$$\sim \left[\begin{array}{cccc|c} 1 & 2 & 0 & 0 & 5 \\ 0 & 1 & -8 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 7 \end{array}\right] \quad 8R_3+R_2$$

$$\sim \left[\begin{array}{cccc|c} 1 & 2 & 0 & 0 & 5 \\ 0 & 1 & 0 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 7 \end{array}\right] \quad -2R_2+R_1$$

$$\sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 5 \\ 0 & 1 & 0 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 7 \end{array}\right]$$

Page No # 2

$\therefore \quad 1x_1 = +0x_2 + 0x_3 + 0x_4 = 5$

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

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

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

$\Rightarrow \quad x_1 = 5$

$x_2 = 7$

$x_3 = -6$

$x_4 = 7$

Q(2): (a)

Ans:

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

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

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

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

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

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 in echelon form

In not in echelon form beccause a matrix to be in echelon form should contain the entries either in decimal or in fraction.

(b)

$$\begin{bmatrix} 1 & 0 & \pi \\ 0 & 1 & e \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

Solution:

$$\begin{bmatrix} 1 & 0 & \pi \\ 0 & 1 & e \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & \pi \\ 0 & 1 & e \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

These are echelon form. A matrix (A) is said to be in echelon form if (i) The first non-zero element in each row, is called its leading entry is 1.
(ii) In any two successive rows i and $i+1$ that do not consist entirely of zeros the leading element in the $(i+1)$ row lies to right at the leading element in i^{th} row.
(iii) Any rows consist entirely of zeros lies at the bottom of the matrix.

Q(2):(c)

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

Solution:

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

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

is in echelon form because it satisfies the 4th condition that is in a column that contain the leading entry of row at the other element are zero.

(d) :
$$\begin{bmatrix} 1 & 0 & 0 & 7 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 4 \end{bmatrix}$$

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

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

is in echelon form because it satisfies the 4th condition that is in a column that contains the leading entry of row all the either elements are zero.

Laden ID# 16268 ID#2 = 6 , ID#3 = 2

ID-1st-last # 1-5

Q:3 (B) Eclelon form by using row operation.

$$\sim \begin{bmatrix} 1 & ID-2 & 8 \\ 2 & 8 & -1 \\ -ID-3 & 0 & 0 \\ 1 & -4 & ID-1-last \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 6 & 8 \\ 2 & 8 & -1 \\ -2 & 0 & 0 \\ 1 & -4 & 1-8 \end{bmatrix}$$

$-2R_1 + R_2$

$$\sim \begin{bmatrix} 1 & 6 & 8 \\ 0 & -4 & -17 \\ -2 & 0 & 0 \\ 1 & -4 & 1-8 \end{bmatrix}$$

$-2(1) + 2 = 0$
$-2(6) + 8 = -4$
$-2(8) - 1 = -17$

$2R_1 + R_3$

$$\sim \begin{bmatrix} 1 & 6 & 8 \\ 0 & -4 & -17 \\ 0 & +12 & +16 \\ 1 & -4 & 1,8 \end{bmatrix}$$

$+2(1) + (-2) = 0$
$+2(6) + 0 = +12$
$+2(8) + 0 = +16$

$-1R_1 + R_4$

$$\sim \begin{bmatrix} 1 & 6 & 8 \\ 0 & -4 & -17 \\ 0 & +12 & +16 \\ 0 & -10 & 10 \end{bmatrix}$$

$-1(1) + 1 = 0$
$-1(6) + (-4) = -10$
$-1(8) + 18) = 10$

xply R_2 by $-1/4$

$$\sim \begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & +17/4 \\ 0 & 12 & 16 \\ 0 & -10 & 10 \end{bmatrix}$$

$0 \times -1/4 = 0$

$\cancel{-4} \times \cancel{-1/4} = 1$

$+17 \times +1/4 = 17/4$

$-12R_2 + R_3$

$$\sim \begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & 17/4 \\ 0 & 0 & -140/4 \\ 0 & -10 & 10 \end{bmatrix}$$

$-12(0) + 0 = 0$

$-12(1) + 12 = 0$

$-12(17/4) + 16 =$

$= \frac{-204 + 64}{4}$

$= -140/4$

$10R_2 + R_4$

$$\sim \begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & 17/4 \\ 0 & 0 & -140/4 \\ 0 & 0 & 210/4 \end{bmatrix}$$

$10(0) + 0 = 0$

$10(1) + (-10) = 0$

$10(17/4) + 10 = \frac{210}{4}$

xply R_3 by $-4/140$

$$\sim \begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & 17/4 \\ 0 & 0 & 1 \\ 0 & 0 & 210/4 \end{bmatrix}$$

$0 \times -4/140 = 0$

$0 \times -4/140 = 0$

$\cancel{-140}/\cancel{4} \times \cancel{-4}/\cancel{140} = 1$

$-210/4\, R_3 + R_4$

$$\sim \begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & 17/4 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$

$(0) - 210/4 * 0 = 0$
$(0) - 210/4 * 0 = 0$
$1(-210/4) + 210/17 = 0$

Result :-

Q (3) (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 form the left is always to the right of the first non-zero number in the row above.

(ii) Rows consisting of all zero are at the bottom of the matrix.

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

1) But on the other hand reduced row echelon form meets different requaired.
(i) It is in echelon form.
ii) The leading entry in each row is a 1 (called a leading 1).
iii) 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 reduced row echelon form:-

Reduce row echelon form is a type of matrix used to solve system of linear equation It has four main requaired which we can talk before. It is used to solve system of linear echelon form or reduced it to row echelon form using determinants, row echelon form using determinants, and so echelon form, using determinant and so be very ineffcient and an easy way to make mistakes.