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Answer NO 1

$$\begin{bmatrix} 1 & 103 & 3 & 0 & 5 \\ 0 & 1 & -10last & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 103 \end{bmatrix}$$

Solution

103 = 2

-10last = -4

$$\begin{bmatrix} 1 & 2 & 3 & 0 & 5 \\ 0 & 1 & -4 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 2 \end{bmatrix}$$

multiplaying Row three by 4 and then add to Row two.

$$\begin{bmatrix} 1 & 2 & 3 & 0 & 5 \\ 0 & 1 & -4+4 & 0 & 7-24 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 2 \end{bmatrix} \quad R_2 + 4R_3$$

$$\begin{bmatrix} 1 & 2 & 3 & 0 & 5 \\ 0 & 1 & 0 & 0 & -17 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 2 \end{bmatrix}$$

Now multiplying Row two by "-2" and then add to Row one.

$$\begin{bmatrix} 1 & 2-2 & 3 & 0 & 5+34 \\ 0 & 1 & 0 & 0 & -17 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 2 \end{bmatrix} R1 - 2R2$$

$$\begin{bmatrix} 1 & 0 & 3 & 0 & 39 \\ 0 & 1 & 0 & 0 & -17 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 2 \end{bmatrix}$$

Now multiplying Row three by "3" and then add to Row one.

$$\begin{bmatrix} 1 & 0 & 3 & 3 & 0 & 39+18 \\ 0 & 1 & 0 & 0 & -17 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 2 \end{bmatrix} R1 - 3R3$$

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 57 \\ 0 & 1 & 0 & 0 & -17 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 2 \end{bmatrix}$$

So this is the simal Augmented matrix

$K1 = 57 \quad K2 = -17 \quad K3 = -6 \quad K4 = 2$

verification :

$K1 + 2K2 + 3K3 = 5$

putting values

$57 + 2(-17) + 3(-6) = 5$

$57 - 34 - 18 = 5$

$57 - 52 = 5$

$5 = 5 \longrightarrow$ true

NOW

$x_2 - 4x_3 = 7$

$-17 - 4(-6) = 7$

$-17 + 24 = 7$

$7 = 7 \rightarrow$ true

Answer No 2:

Part A:

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

solution:

first into second :

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

multiplying Row two by "2" and then add to Row three

$$\begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 2-2 & -5+8 & -1+4 \end{bmatrix} \quad R3 - 2R2$$

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

So this is matrix two

Second matrix and first

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

multiply Row two by "2" and then add to Row one.

$$\begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 0+2 & -5+3 & 4-5 \end{bmatrix} R3 + 2R2$$

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

So this is the first matrix

Answer No 2

part B:

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

Solution

it is in echelon form because it satisfies all the following condition

(1) all the entries in a colum below a leading entry are zero

(2) each leading entry of a row is in a colum to the right of the leading entry of the above row

(3) To satisfy the 3rd condition there is no

zero-row which should be below the all non-zero

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

it is in reduced echelon form becous it is aleardy in echald form and satisfy the further two condition

(1) all the leading 1 is entreis in non zero rows are one.

(2) Each leading 1 is the only non zero entry in its column

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

Answer NO c:

it is in echelon form because it satisfy all the following condition

(1) all the entries of a row in a column below leading entry are zero

(2) each leading entry of a row is in column to the right of the leading entry of the above row

(3) to the satisfy the 3rd condition there is No zero which should be below the all non zero rows

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

it is neither in
echelon form nor
in reduced echelon
form because it echelon
satisfy the following condition

(1) All the zero rows are
below the non zero row

Answer No (3)

part A

the difference between echelon
form and reduced echelon
form are given below

echelon form :

A rectangular matrix is
in echelon for row echelon
form if it has the following

three properties:

(1) All non zero row are above any rows of all zero

(2) each leading entry of a row is in a colum to the right of leading entry of the row above it

(3) All entry in a colum below a leading entry are a zero

Reduced Ehelon form

if a matrix in echelon form satisfy the following additional condition then it is in reduced echelon form for reduced row echelon form.

(1) The leading entry in each non zero row is (one)

(2) each leading 1 is the only non zero entry in its column.

Answer NO 3:

part (b)

$$\begin{bmatrix} 1 & 102 & 8 \\ 2 & 8 & -1 \\ 103 & 6 & 0 \\ 1 & -4 & 10 \end{bmatrix}$$

Solution :

10 =

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

multiply Row 1or by "2" and subtract Row two form Row four.

$$\begin{bmatrix} 1 & 6 & 8 \\ 2 & 8 & -1 \\ -2 & 0 & 0 \\ 0 & -16 & 24 \end{bmatrix} \quad 2R_4 - R_2$$

Now add Row two Row three

$$\begin{bmatrix} 1 & 6 & 5 \\ 2 & 5 & -1 \\ 0 & 5 & -1 \\ 0 & -16 & 29 \end{bmatrix} R_3 + R_2$$

Now multiply Row three by two "2" and then add to Row 4.

$$\begin{bmatrix} 1 & 6 & 5 \\ 2 & 5 & -1 \\ 0 & 5 & -1 \\ 0 & 0 & 27 \end{bmatrix} R_4 + 2R_3$$

Now subtract Row two from three Row

$$\begin{bmatrix} 1 & 6 & 5 \\ 2 & 5 & -1 \\ -2 & 0 & 0 \\ 0 & 0 & 27 \end{bmatrix} R_3 - R_2$$

Now add Row three to Row two

$$\begin{bmatrix} 1 & 6 & 5 \\ 0 & 5 & -1 \\ -2 & 0 & 6 \\ 0 & 0 & 27 \end{bmatrix}$$

Now multiply Row two by (-3) and then subtract from (+1) times of Row one

$$\begin{bmatrix} 1 & 0 & 35 \\ 0 & 5 & -1 \\ -2 & 0 & 0 \\ 6 & 0 & 27 \end{bmatrix} \quad 4R_1 - 3R_2$$

Now multiply Row one by "2" and then add to Row three

$$\begin{bmatrix} 1 & 0 & 35 \\ 0 & 5 & -1 \\ 6 & 0 & 70 \\ 0 & 0 & 27 \end{bmatrix} \quad R_3 + 2R_1$$

Now multiply Row three by "2" and then add to 5 times of Row "4"

$$\begin{bmatrix} 1 & 0 & 35 \\ 0 & 5 & -1 \\ 0 & 0 & 20 \\ 0 & 0 & -5 \end{bmatrix} 5R4 - 2R3$$

Now multiply Row four by "4" and then add to Row three.

$$\begin{bmatrix} 1 & 0 & 35 \\ 0 & 5 & -1 \\ 0 & 0 & 0 \\ 0 & 0 & -5 \end{bmatrix} R3 + 4R4$$

Now interchang R3 into R4.

$$\begin{bmatrix} 1 & 0 & 35 \\ 0 & 5 & -1 \\ 0 & 0 & -5 \\ 0 & 0 & 0 \end{bmatrix} R3 \leftrightarrow R4$$

This is required echelon

END