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# Question 1

Answer

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

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

$R_1 - 5R_2 \rightarrow R_1$

$$= \begin{bmatrix} 1 & 0 & 38 & 0 & -30 \\ 0 & 1 & -7 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 5 \end{bmatrix}$$

$R_1 - 38R_3 = R_1 \rightarrow R_2 + 7R_3 \rightarrow R_2$

$$= \begin{bmatrix} 1 & 0 & 0 & 0 & 198 \\ 0 & 1 & 0 & 0 & -35 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & 5 \end{bmatrix}$$

Reduce Echelon form.



## Question # 2 Part (A)

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

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

$$R_3 - 2R_2 \rightarrow R_3$$

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

Now matrix transform to ~~next~~ <sup>second</sup> matrix

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

$$R_3 + R_2 \rightarrow R_3$$



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

we take again

$$R_3 + R_2 \rightarrow R_3$$

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

now second matrix transfer into first matrix

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} =$$



## Question 2 Part (B)

$$(a) \quad = \begin{bmatrix} e & 0 & 0 & 0 \\ 0 & \pi & 0 & 0 \\ 0 & 0 & -\pi & 0 \\ 0 & 0 & 0 & e \end{bmatrix} \text{ is echelon form}$$

now it echelon form because first row become one and last is zero.  
 Second row and second every element can become one and last is zero  
 Therefore third is same.

$$(b) \quad = \begin{bmatrix} 1 & 0 & \pi \\ 0 & 1 & e \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \text{ is echelon form}$$

now it is same to Part (a).

first row can become 1 and below zero  
 second row made 1 and last zero.  
 third and fourth row is zero.



Question 2 (c)

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

is in reduced row echelon form

Now it reduce form because first row become one and below zero. Second row is one and below zero. In third is similar, in zero.

Question 2 (d)

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

is in reduced row echelon form

Now it reduced row form. first row become 1 and below 0. second is totally zero, and similarly third row. So, it reduced row echelon form.



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### Question 3 (a)

Difference between row echelon

and reduce row echelon form.

The row echelon form in first element of one row and after is zero. The second row element is one and below is all zero.

while in reduced echelon form first row of one and below is zero.

Second element of second row one and its below all zero. The row reduced

is used to solve statement.

for example:

$$2x_1 + 3x_2 - 4x_3 = 1$$

$$x_1 + 5x_2 + 6x_3 = 0$$

$$-4x_1 + x_2 - 3x_3 = 2$$



Question 3 (b)

find echelon form.

$$= \begin{bmatrix} 1 & 102 & 8 \\ 2 & 8 & -1 \\ -103 & 0 & 0 \\ 1 & -4 & 10 \text{ First. Last} \end{bmatrix}$$

for now

$$= \begin{bmatrix} 1 & 6 & 8 \\ 2 & 8 & -1 \\ -5 & 0 & 0 \\ 1 & -4 & 17 \end{bmatrix}$$

now

$$R_2 - 2R_1 \rightarrow R_2$$

$$R_3 + 5R_1 \rightarrow R_3$$

$$R_4 - R_1 \rightarrow R_4$$

$$= \begin{bmatrix} 1 & 6 & 8 \\ 0 & -4 & -17 \\ 0 & 30 & 40 \\ 0 & -10 & 9 \end{bmatrix}$$



Now Divide the  $R_2$  by 4

$$= \begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & 17/4 \\ 0 & 3 & 4 \\ 0 & -10 & 9 \end{bmatrix}$$

$$R_3 - 3R_2 \rightarrow R_3$$

$$R_4 + 10R_2 \rightarrow R_4$$

$$\begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & 17/4 \\ 0 & 0 & -35/4 \\ 0 & 0 & 93/2 \end{bmatrix}$$

now it is echelon form

now  $R_3 \times (-4/35)$

$$= \begin{bmatrix} 1 & 6 & 8 \\ 0 & 1 & 17/4 \\ 0 & 0 & 1 \\ 0 & 0 & 93/2 \end{bmatrix}$$

END

