



(Linear-Algebra)

Mid Paper

Submitted To:

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QNO: 01

Augmented Matrix:

Page 01

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BsSE 2nd Sem

ID # 11220

Q NO: 01

ID# = 2

ID.Last = 0

$$\left[\begin{array}{cccc|c} 1 & 2 & 3 & 0 & 5 \\ 0 & 1 & 0 & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & a \end{array} \right]$$

The above matrix is the augmented matrix :-

$$\begin{aligned} x_4 &= a & x_2 &= ? \\ x_3 &= -6 & x_1 &= ? \end{aligned}$$

From R_2 :

$$x_2 - 0x_3 = 7$$

$$\boxed{x_2 = 7}$$

Now from R_1 :

$$x_1 + 2x_2 + 3x_3 = 5$$

$$x_1 + 2(7) + 3(-6) = 5$$

$$x_1 + 14 - 18 = 5$$

$$x_1 = -14 + 18 + 5$$

$$x_1 = -14 + 23$$

$$x_1 = \boxed{09}$$

$$\boxed{x_2 = 7}, \quad \boxed{x_1 = 09} \quad \text{Ans.}$$

Q²
(a)

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

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

Transforming matrix $\textcircled{1}$ into matrix $\textcircled{2}$
by multiplying R_2 with (2) &
then subtract it from R_2 in
matrix $\textcircled{1}$

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

Now transform matrix $\textcircled{2}$ into matrix $\textcircled{1}$
by multiplying R_2 with 2 & adding
with R_3 in matrix $\textcircled{2}$

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

Page 3M: 11/11/21Q2:
⑥:-

- ① its a triangular matrix because all the elements are zero below $\&$ above the diagonal so its reduced echelon form if we take common from R_1 and R_2 $\&$ R_3 .
- ② its upper triangular matrix:
so due to this its echelon matrix:
- ③ its triangular matrix.
 $\&$ its reduced echelon form we take common from R_1
- ④ its reduced echelon form:
because the leading element is 1 $\&$ its triangular form.

😊
Answered:

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Q3: (a): Diff between Echelon & Reduce Echelon:

Echelon form :-

- ① all non zero rows are above any row of all zero.
- ② each leading entry of a row is in a column to the right of the leading entry of the row above it.
- ③ all entries in a column below a leading entry are zero.

Reduce
Echelon
form :-

- ① the leading entry in each non zero row is 1
- ② each leading 1 is the only non zero entry in its column.

Example:

Echelon

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

:

Reduce Echelon:

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

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Q3:

⑥:

Given matrix:

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

Solution:

$$\rightarrow \begin{bmatrix} 1 & 8 & 8 \\ 0 & -8 & -17 \\ 0 & 16 & 16 \\ 0 & -12 & 6 \end{bmatrix} \begin{array}{l} R_2 - 2R_1 \\ R_3 - 4R_1 \\ R_4 - R_1 \end{array}$$

$$\rightarrow \begin{bmatrix} 1 & 8 & 8 \\ 0 & -8 & -17 \\ 0 & 1 & 1 \\ 0 & -12 & 6 \end{bmatrix} \begin{array}{l} \text{Taking "6"} \\ \leftarrow \text{common } (R_3) \end{array}$$

$$\rightarrow \begin{bmatrix} 1 & 6 & 8 \\ 0 & -8 & -17 \\ 0 & 0 & 0 \\ 0 & 0 & 7 \end{bmatrix} \begin{array}{l} 8R_3 - R_1 \\ R_4 - 11R_3 \end{array}$$

$$\rightarrow \begin{bmatrix} 1 & 8 & 8 \\ 0 & -8 & -17 \\ 0 & 0 & 7 \\ 0 & 0 & 0 \end{bmatrix} R_3 \leftrightarrow R_4$$

Answer
Finished
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