Mid Exam Summer

Submitted By:

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BS (SE-8) Section: A

Submitted To:

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Dated: 21st August 2020

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Q1

Answer:

$$= \left[\begin{array}{ccc|c} 1 & -3 & 4 & -3 \\ -3 & -7 & 7 & -3 \\ -4 & 6 & 1 & 0 \end{array}\right]$$

$$= \left[\begin{array}{ccc|c} -3 & -7 & 7 & -3 \\ 1 & -3 & 4 & -3 \\ -4 & 6 & 1 & 0 \end{array}\right] \quad R_1 \leftrightarrow R_2$$

$$= \left[\begin{array}{ccc|c} -1 & -13 & 15 & -9 \\ 1 & -3 & 4 & -3 \\ -4 & 6 & 1 & 0 \end{array}\right] \quad R_1 + 2R_2$$

$$= \left[\begin{array}{ccc|c} 1 & 13 & -15 & 9 \\ 1 & -3 & 4 & -3 \\ -4 & 6 & 1 & 0 \end{array}\right] -R_1$$

$$= \left[\begin{array}{ccc|c} 1 & 13 & -15 & 9 \\ 1 & -3 & 4 & 3 \\ -2 & 3 & \frac{1}{2} & 0 \end{array}\right] \frac{1}{2}R_3$$

$$= \left[\begin{array}{ccc|c} 1 & 13 & -15 & 9 \\ 0 & -16 & 19 & -12 \\ -4 & 6 & 1 & 0 \end{array}\right] \quad R_2 - R_1$$

$$= \left[\begin{array}{ccc|c} 1 & 13 & -15 & 9 \\ 4 & -12 & 16 & -12 \\ -4 & 6 & 1 & 0 \end{array}\right] \quad 4R_2$$

$$= \left[\begin{array}{ccc|c} 1 & 13 & -15 & 9 \\ 0 & -6 & 15 & -12 \\ -4 & 6 & 1 & 0 \end{array}\right] \quad R_2 + R_3 \quad \times$$

$$= \left[\begin{array}{ccc|c} 1 & 13 & -15 & 9 \\ 4 & -12 & 16 & -12 \\ 0 & -6 & 17 & -12 \end{array}\right]$$

$-12-36$

$$\left[\begin{array}{ccc|c} 1 & 13 & -15 & 9 \\ 0 & -64 & 76 & -48 \\ 0 & -6 & 17 & -12 \end{array}\right] \quad R_2 - 4R_1$$

From the above Augmented matrix.

$$\boxed{\begin{aligned} x &= \frac{11}{10} \\ y &= \frac{9}{15} \\ z &= \frac{13}{6} \end{aligned}}$$

X ———— X ————

Q2 Part A

Answer:

(1)

Question # 2 (a)

Find Inverse of Matrix

$$\begin{bmatrix} ID3 & -1 & 0 \\ 0 & 1 & ID3 \\ 1 & 1 & 0 \end{bmatrix}$$

Solution:

My id is 13033

So $ID3 = 0$

Putting value in matrix

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

Taking determent.

$$|A| = \begin{vmatrix} 0 & -1 & 0 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \end{vmatrix}$$

$$= 0 \times \begin{vmatrix} 1 & 0 \\ 1 & 0 \end{vmatrix} + 1 \times \begin{vmatrix} 0 & 0 \\ 1 & 0 \end{vmatrix} + 0 \begin{vmatrix} 0 \\ 1 \end{vmatrix}$$

$0 \times (1 \times 0 - 0 \times 1) + 1 (0 \times 0 - 0 \times 1) + 0 (0 \times 1 - 1$

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

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

$= -0 - 0 + 0$

$= 0$

Now Taking adj :-

$$Adj(A) = Adj \begin{bmatrix} 0 & -1 & 0 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \end{bmatrix}$$

$$\begin{bmatrix} +\begin{vmatrix} 1 & 0 \\ 1 & 0 \end{vmatrix} & -\begin{vmatrix} 0 & 0 \\ 1 & 0 \end{vmatrix} & +\begin{vmatrix} 0 & 1 \\ 1 & 1 \end{vmatrix} \\ -\begin{vmatrix} -1 & 0 \\ 1 & 0 \end{vmatrix} & +\begin{vmatrix} 0 & 0 \\ 1 & 0 \end{vmatrix} & -\begin{vmatrix} 0 & -1 \\ 1 & 1 \end{vmatrix} \\ +\begin{vmatrix} -1 & 0 \\ 1 & 0 \end{vmatrix} & -\begin{vmatrix} 0 & 0 \\ 0 & 0 \end{vmatrix} & +\begin{vmatrix} 0 & -1 \\ 0 & 1 \end{vmatrix} \end{bmatrix}$$

$$= \begin{bmatrix} +(1\times 0 - 0\times 1) & -(0\times 0 - 0\times 1) & +(0\times 1 - 1\times 1) \\ -1(-1\times 0 - 0\times 1) & +(0\times 0 - 0\times 1) & -(0\times 1 - (1)\times 1) \\ +(1\times 0 - 0\times 1) & -(0\times 0 - 0\times 0) & +(0\times 1 - (-1)\times \end{bmatrix}$$

$$\begin{bmatrix} +(0-0) & -(0-0) & +(0-1) \\ -(0+0) & +(0+0) & -(0+1) \\ +(-0+0) & -(0+0) & +(0+0) \end{bmatrix}^t$$

$$= \begin{bmatrix} -0 & 0 & -1 \\ 0 & 0 & -1 \\ -0 & -0 & 0 \end{bmatrix}^t$$

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

Now taking, $A^{-1} = \frac{1}{|A|} \times Adj(A)$

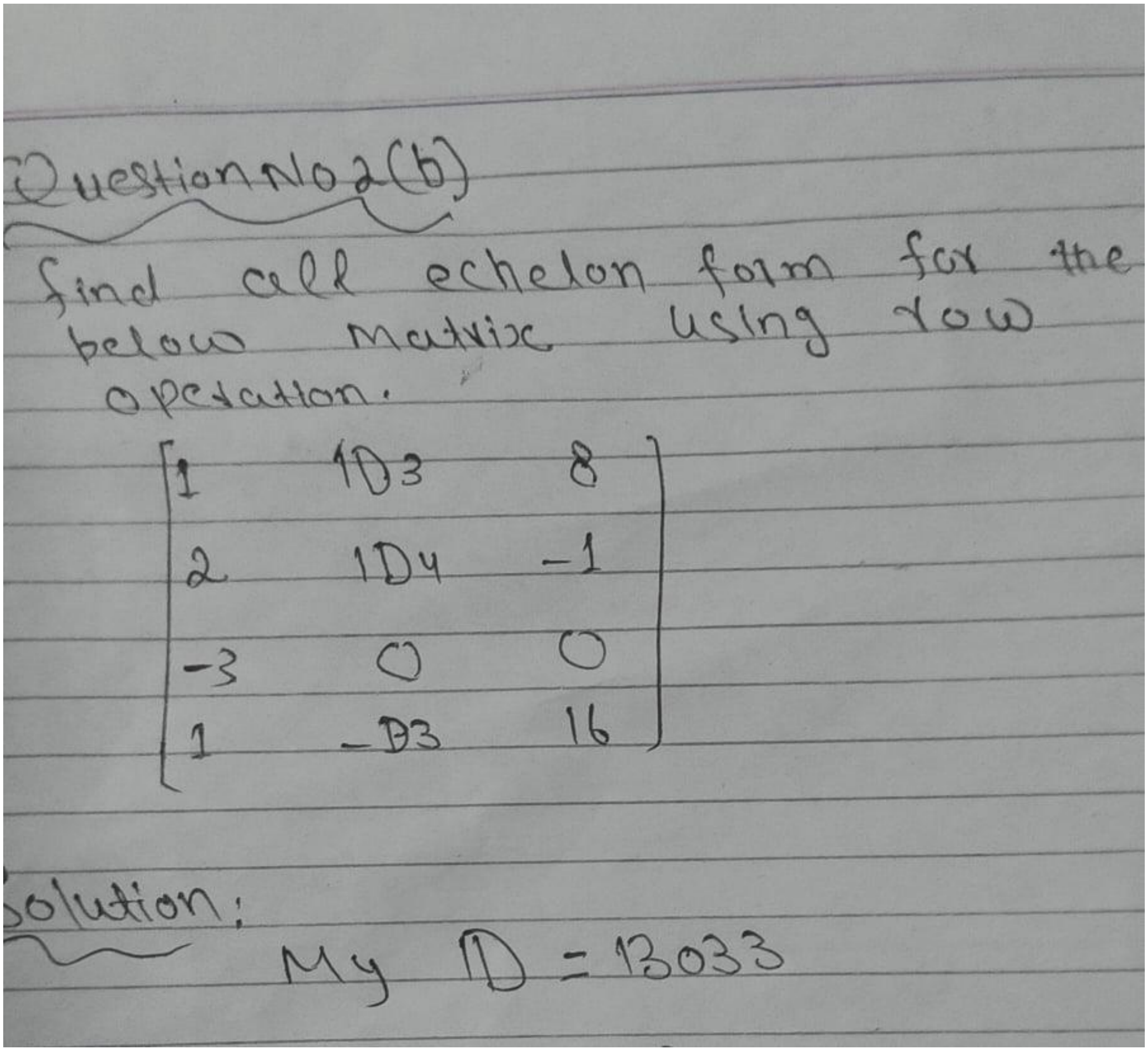
$$= \left(\frac{1}{0}\right) \begin{bmatrix} -0 & 0 & -0 \\ 0 & 0 & -0 \\ -1 & -1 & 0 \end{bmatrix}$$

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

Answer.

Question 2 Part B

Answer



Question No 2(b)

find cell echelon form for the below matrix using row operation.

$$\begin{bmatrix} 1 & 1D3 & 8 \\ 2 & 1D4 & -1 \\ -3 & 0 & 0 \\ 1 & -D3 & 16 \end{bmatrix}$$

Solution:

My ID = 13033

Solution let $A = \begin{bmatrix} 1 & 0 & 8 \\ 2 & 3 & -1 \\ -3 & 0 & 0 \\ 1 & -0 & 16 \end{bmatrix}$

by Row operation.

$$A = \begin{bmatrix} 1 & 0 & 8 \\ 0 & 3 & -33 \\ -3 & 0 & 0 \\ 1 & 0 & 16 \end{bmatrix} \quad R_2 - 2R_4$$

$$= \begin{bmatrix} 1 & 0 & 8 \\ 0 & 3 & -33 \\ 0 & 0 & -48 \\ 1 & 0 & 16 \end{bmatrix} \quad R_3 - 3R_4$$

$$= \begin{bmatrix} 1 & 0 & 8 \\ 0 & 3 & -33 \\ 0 & 0 & -48 \\ 0 & 0 & 8 \end{bmatrix} \quad R_4 - R_1$$

$$= \begin{bmatrix} 1 & 0 & 8 \\ 0 & 3 & -33 \\ 0 & 0 & -8 \\ 0 & 0 & 8 \end{bmatrix} \quad \frac{R_3}{6}$$

$$= \begin{bmatrix} 1 & 0 & 8 \\ 0 & 3 & -33 \\ 0 & 0 & -8 \\ 0 & 0 & 0 \end{bmatrix} \quad R_3 + R_4$$

Requird acholon form

Question 3

Answer

(3) $\Rightarrow A = \begin{bmatrix} 0 & -6 & 2 \\ -6 & 3 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ For eigen value.

$$|(A - \lambda I)| = 0$$

$$= \left| \begin{pmatrix} 0 & -6 & 2 \\ -6 & 3 & -4 \\ 2 & -4 & 3 \end{pmatrix} - \begin{pmatrix} \lambda & 0 & 0 \\ 0 & \lambda & 0 \\ 0 & 0 & \lambda \end{pmatrix} \right| = 0$$

$$= \begin{vmatrix} -\lambda & -6 & 2 \\ -6 & 3-\lambda & -4 \\ 2 & -4 & 3-\lambda \end{vmatrix} = 0$$

$$= -\lambda\Big((3-\lambda)(3-\lambda) - 16\Big) + 6\Big((3-\lambda)(-6) + 8\Big)$$
$$+2\Big(24 - (2)(3-\lambda)\Big) = 0$$

$$= -\lambda\Big(9 - 3\lambda - 3\lambda + \lambda^2 - 16\Big) + 6\Big(-18 + 6\lambda + 8\Big)$$
$$2\Big(48 - 4(3-\lambda)\Big) = 0$$

$$= -9\lambda + 3\lambda^2 + 3\lambda^2 - \lambda^3 + 16\lambda - 108 + 36\lambda + 48$$
$$+ 48 - 12 + 4\lambda = 0$$

$$= \lambda^3 + 6\lambda^2 + 47\lambda - 24 = 0$$

$$= \lambda(\lambda^2 + 6\lambda + 47) = 24$$

$$\boxed{\lambda_1 = 24}$$

again $\lambda^2 + 6\lambda + 47 = 24$

$\lambda^2 + 6\lambda + 23 = 0$

Here $a = 1$, $b = 6$, $c = 23$

$$= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$ using quadratic equation

$$= \frac{-b \pm \sqrt{36+92}}{2}$$

$$= L_2 = \frac{-6 + \sqrt{128}}{2}$$

$$= L_3 = \frac{-6 - \sqrt{128}}{2}$$

$$L_2 = \frac{-6+11}{2} = \frac{5}{2}$$

$$L_3 = \frac{-6-11}{2} = \frac{-17}{2}$$

Eigen values is

$$\boxed{\begin{aligned} L_1 &= 24 \\ L_2 &= 5/2 \\ L_3 &= \frac{-17}{2} \end{aligned}}$$