Q3 Find the Eigen values and Eigen Vectors of the below matrix

$$\begin{bmatrix} ID3 & -6 & 2 \\ -6 & ID2 & -4 \\ 2 & -4 & ID4 \end{bmatrix}$$

Sol:: ID1 = 1, ID2 = 4, ID3 = 0, ID4 =
ID5 = 1

Putting values in The matrix

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

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

$$\begin{bmatrix} 0 & -6 & 2 \\ -6 & 4 & -4 \\ 2 & -4 & 7 \end{bmatrix} - \lambda \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} =$$

$$\begin{bmatrix} 0 & -6 & 2 \\ -6 & 4 & -4 \\ 2 & 4 & 7 \end{bmatrix} - \begin{matrix} \lambda & 0 & 0 \\ 0 & \lambda & 0 \\ 0 & 0 & \lambda \end{matrix} = 0$$

Putting $\lambda = 0$

$$\begin{bmatrix} 0 & -6 & 2 \\ -6 & 4 & -4 \\ 2 & -4 & 7 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$-6y + 2z = 0 \rightarrow$ eq 1

$-6x + 4y - 4z = 0 \rightarrow$ eq 2

$2x - 4y + 7z = 0 \rightarrow$ eq 3

Taking equation 2 and 3

$$\frac{x}{28-16} = \frac{-y}{-8+42} = \frac{z}{24-8}$$

$$\frac{x}{12} = \frac{y}{34} = \frac{z}{16}$$

$$\frac{x}{6} = \frac{y}{17} = \frac{z}{8}$$

Eigen vector $= \begin{bmatrix} 6 \\ 17 \\ 8 \end{bmatrix}$ correspond

$\lambda = 0$

$$\begin{bmatrix} 0-\lambda & -6 & 2 \\ -6 & 4-\lambda & -4 \\ 2 & -4 & 7-\lambda \end{bmatrix} = 0$$

$\Rightarrow -\lambda[(4-\lambda)(-7-\lambda)-(-4\times-4)]+6[(-6)$
$(7-\lambda)-(2x+4]+2[+6x(-4)-(2(4-\lambda))]$

$\Rightarrow -\lambda^3 - 3\lambda^2 + 84\lambda - 172$

$\lambda(-\lambda 2 - 3\lambda + 84 - 172) = 0$

$\lambda = 0$

$\lambda 2 - 3\lambda - 88$

$-\lambda 2 - 8\lambda - 111 - 88$

$-\lambda(\lambda+8) - 11(\lambda + 88)$

Eigen value is $0, 8 - 11$

$\lambda = 0, \lambda = -8\ \lambda = -11$

Eigen vector

$[A - \lambda I][x] = 0$

$$\begin{bmatrix} 0-\lambda & -6 & 2 \\ -6 & 4-\lambda & -4 \\ 2 & -4 & 7-\lambda \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

Q1 Solve the system of equations that corresponds to this augmented matrix.

$$\begin{bmatrix} 1 & -3 & 4 & -102 \\ 3 & -7 & 7 & -104 \\ -4 & 6 & -1 & 103 \end{bmatrix}$$

sol:-
$$\begin{bmatrix} 1 & -3 & 4 & -102 \\ 3 & -7 & 7 & -104 \\ -4 & 6 & -1 & 103 \end{bmatrix}$$

Evaluate.

$$\begin{matrix} 1 & -3 & 4 & -102 \\ 3 & -7 & 7 & -104 \\ -4 & 6 & -1 & 103 \end{matrix}$$

transpose matrix

$$\begin{pmatrix} 1 & 3 & -4 \\ -3 & -7 & 6 \\ 4 & 7 & -1 \\ -102 & -104 & 103. \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & -7 & 20 \\ 6 & 1 & 2 & 101 \\ 0 & 0 & -\frac{5}{2} & 301 \end{pmatrix}$$

Sol:- according to my ID = 14071
ID1 = 1, ID2 = 4, ID3 = 0 ID4 = 7
ID5 = 1

matrix $\begin{bmatrix} 1 & 0 & 8 \\ 2 & 7 & 1 \\ -3 & 0 & 0 \\ 1 & 0 & 16 \end{bmatrix}$

$A = \begin{bmatrix} 1 & 0 & 8 \\ 2 & 7 & 1 \\ -3 & 0 & 0 \\ 1 & 0 & 16 \end{bmatrix}$ $R2 \to R2 - 2R1$
$R3 \to R3 + 3R1$
$R4 \to R4 - R1$

$\begin{bmatrix} 1 & 0 & 8 \\ 0 & 7 & -15 \\ 0 & 0 & 24 \\ 0 & 0 & 8 \end{bmatrix}$ $R3 \to R3 - 3R4$

$\begin{bmatrix} 1 & 0 & 8 \\ 0 & 7 & -15 \\ 0 & 0 & 0 \\ 0 & 0 & 8 \end{bmatrix}$ $R3 \leftrightarrow R4$

$\begin{bmatrix} 1 & 0 & 8 \\ 0 & 7 & -15 \\ 0 & 0 & 8 \\ 0 & 0 & 0 \end{bmatrix}$ = Now The matrix is in echelon from

$P(A)$ = Total number of NON-Zero Raws = 3

Q 2 Part (a)

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

$$\det(A) \rightarrow 0\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix} - (-1)\begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix} + 0\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$$

$$\Rightarrow 0[0-0] + 1[0-0] + 0[0-1]$$

$$\Rightarrow 0 + 0 + 0$$

$$= \det(A) = 0$$

As we know
if The determinant is 0, Then
The matrix has no inverse

B) find an echelwn from the bel
matrix using row operations.

$$\begin{bmatrix} 1 & ID3 & 8 \\ 2 & ID4 & -1 \\ -3 & 0 & 0 \\ 1 & ID3 & 16 \end{bmatrix}$$