$with(LinearAlgebra):$

$A := Matrix([[1., 0., 1.], [0., 2., 0.], [-3., 0., 5.]]);$

$$A := \begin{bmatrix} 1. & 0. & 1. \\ 0. & 2. & 0. \\ -3. & 0. & 5. \end{bmatrix} \quad (1)$$

$B := A^{(-1)}:$

$Eigenvalues(A);$

$$\begin{bmatrix} 2. + 0.\,I \\ 4. + 0.\,I \\ 2. + 0.\,I \end{bmatrix} \quad (2)$$

$Eigenvectors(A);$

$$\begin{bmatrix} 2. + 0.\,I \\ 4. + 0.\,I \\ 2. + 0.\,I \end{bmatrix}, \begin{bmatrix} -0.707106781186547 + 0.\,I & -0.316227766016838 + 0.\,I & 0.\,I \\ 0.\,I & 0.\,I & 1. + 0.\,I \\ -0.707106781186547 + 0.\,I & -0.948683298050514 + 0.\,I & 0.\,I \end{bmatrix} \quad (3)$$

$Tr := Transpose(B);$

$Eigenvalues(Tr);$

$Eigenvectors(Tr);$

$$Tr := \begin{bmatrix} 0.625000000000000 & -0. & 0.375000000000000 \\ 0. & 0.500000000000000 & 0. \\ -0.125000000000000 & 0. & 0.125000000000000 \end{bmatrix}$$

$$\begin{bmatrix} 0.500000000000000 + 0.\,I \\ 0.250000000000000 + 0.\,I \\ 0.500000000000000 + 0.\,I \end{bmatrix}$$

$$\begin{bmatrix} 0.500000000000000 + 0.\,I \\ 0.250000000000000 + 0.\,I \\ 0.500000000000000 + 0.\,I \end{bmatrix}, \quad (4)$$

$$\begin{bmatrix} 0.948683298050514 + 0.\,I & -0.707106781186547 + 0.\,I & 0.\,I \\ 0.\,I & 0.\,I & 1. + 0.\,I \\ -0.316227766016838 + 0.\,I & 0.707106781186547 + 0.\,I & 0.\,I \end{bmatrix}$$

1. Observe that the eigenvalue with multiplicity 2 for A is 2 that appears as first and third eigenvalue. The eigenvalue 4 is simple

2. The eigenvectors associated to the eigenvalue 2 for A are the points P(-1: 0: -1) and Y(0: 1: 0) that generated the line m[1: 0: -1]: a line of fixed points, **m is the axis**.

3. The point C(1: 0: 3) (second eigenvector to A), is the eigenvector to 4. **C is the centre**.

4. Observe that **m** appears as the **egenvector to the eigenvalue 1/4 to Tr** (of course if a line is inveriant pointwise it is invariant as a set).

5. The lines **l[3: 0:-1]** (eigenvector no. 1 to Tr) and **n[0,1,0]** (eigenvector no. 3 to Tr) are the **eigenvector to the eigenvalue 1/2 to Tr. They pass the centre C(1: 0: 3),**.