$\therefore$ Rank $(A) = 4$.

## Eigen value of a square matrix A

A scalar $\lambda$ is said to be eigen value of a square matrix A if $AX = \lambda X$, where $X \neq 0$ and X is known as the eigen vector of matrix A corresponding to the eigen value $\lambda$.

## A.M:- (Algebraic multiplicity)

~~Algebraic multiplicity of an eigen value~~

No. of repeatation of an eigen value $\lambda$ is known as the AM of $\lambda$.

## G.M (Geometric multiplicity) :-

The no. of linearly independent eigen vectors corresponding to an eigen value $\lambda$ is known as the GM of $\lambda$.

* GM can not exceed AM. $[GM \leq AM]$
* $AX = \lambda X$, $X \neq 0$

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

$\Rightarrow |A - \lambda I||X| = 0$

$\Rightarrow |A - \lambda I| = 0$ → characteristic equation.

Q:- $A = \begin{bmatrix} 0 & 0 & -2 \\ 1 & 2 & 1 \\ 1 & 0 & 3 \end{bmatrix}$, Find the EV and eigen vector of this matrix.

Put $|A - \lambda I| = 0$ or $\lambda^3 - \text{trace}(A)\lambda^2 + (|M_{11}| + |M_{22}| + |M_{33}|)\lambda - |A| = 0$