Eigenvectors and Eigenvalues

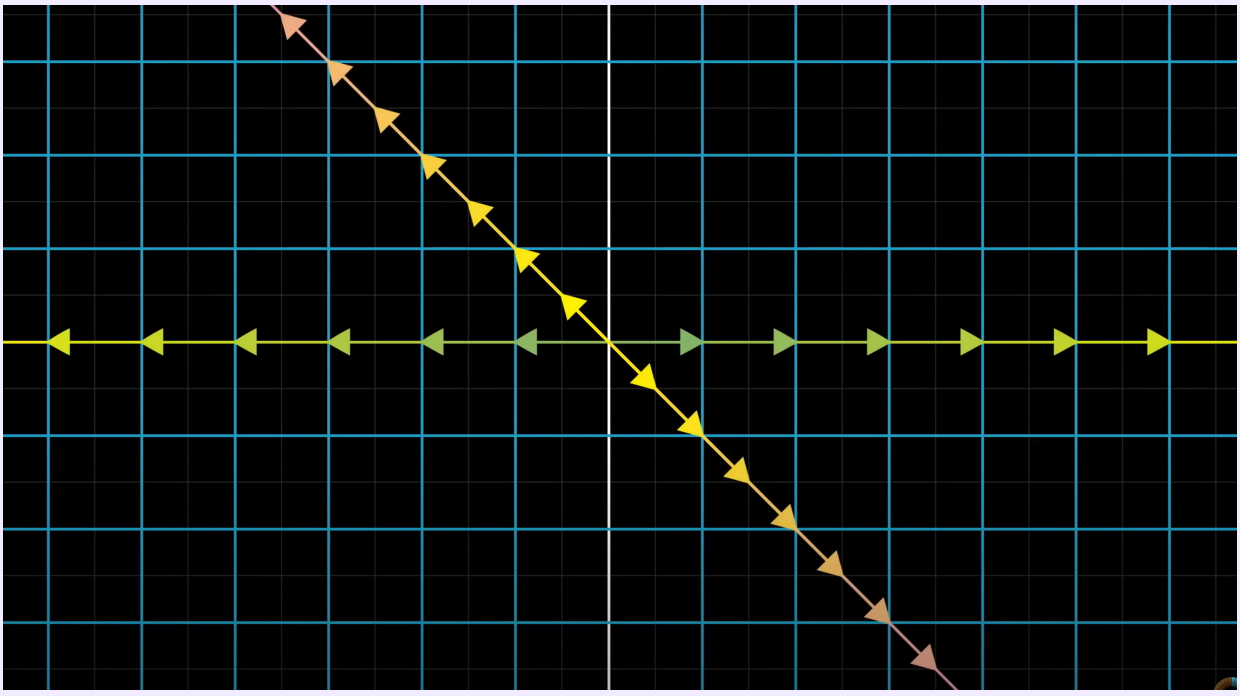
In a transformation, eigenvectors are the vectors that don't change direction, but get just scaled.

The factors by which they get scaled is called eigenvalue, and each eigenvactor has an associated eigenvalue.

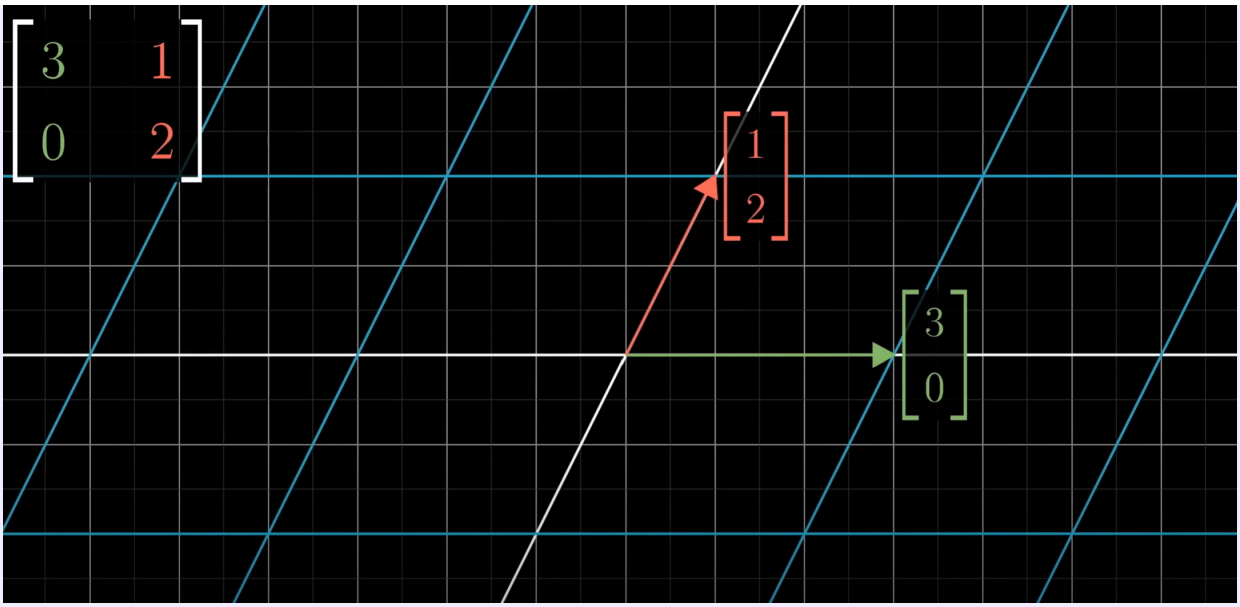
There can also be no eigenvectors.

Example

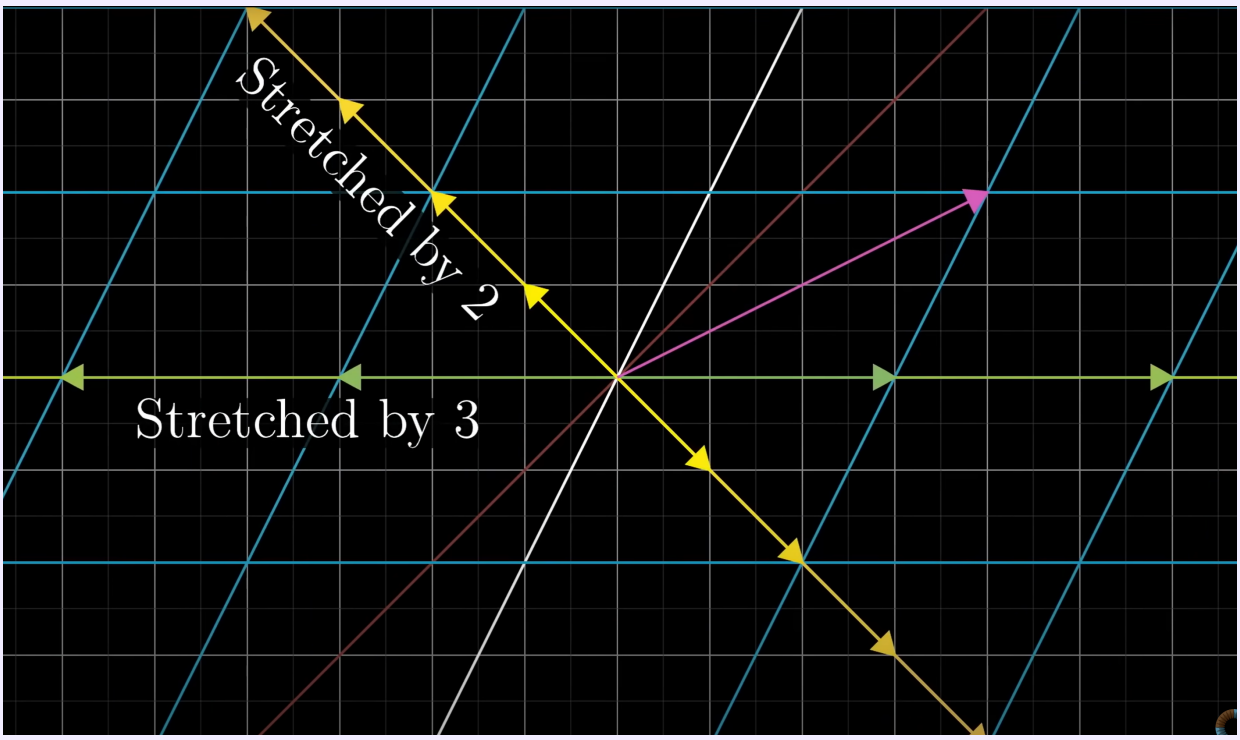
Imagine we have two vectors in the basic plane:



We put the plane through the transformation: $\begin{bmatrix} 3 & 1 \\ 0 & 2 \end{bmatrix}$



Every other vector drifts to another direction, but not these guys.



These vectors just get scaled.

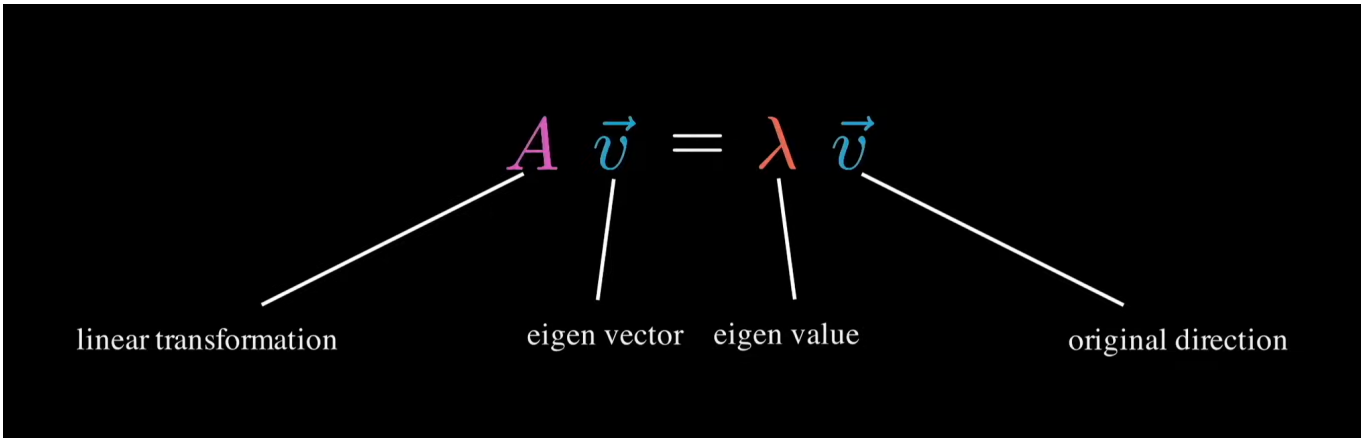
Info

The determinant of a matrix is the product of eigenvalues.

Info

In a 3D rotation, the axis of rotation is an eigenvector. It doesn't change direction.

Formal definition



The eigen vectors are such that when receiving a linear transformation, they stay on the same original direction, only scaled by their eigenvalue(λ).