Eigen vector/values

Vectors has magnitude (size) and direction

Magnitude of (a, b) eigen values

$$||(a,b)|| = \sqrt{a^2+b^2}$$

∴ Direction (a, b)

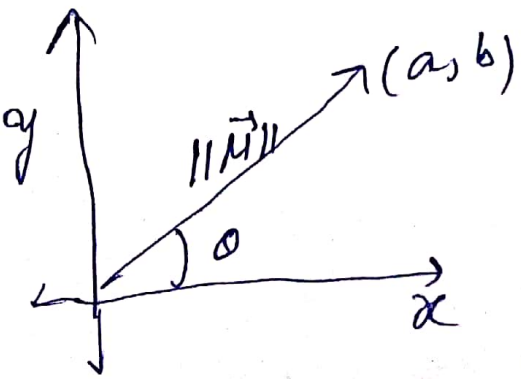
$$\theta = \tan^{-1}\left(\frac{b}{a}\right)$$

Components from magnitude $||\vec{u}||$ and direction θ

$$(||\vec{u}|| \cos(\theta), ||\vec{u}|| \sin(\theta))$$

Vectors can be represented in component format.

* We can plot vectors on the coordinate plane by drawing a directed line segment from the origin to the point that ~~coordinate~~ corresponds to the vector's components.



* Magnitude of a vector $\vec{v}$ is written as $||\vec{v}||$

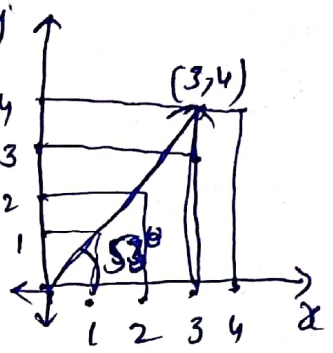
Ex Magnitude of (3, 4) is $\sqrt{3^2+4^2} = \sqrt{25} = 5$

Direction from components — eigen vector

$$\theta = \tan^{-1}\left(\frac{b}{a}\right)$$

① direction of (3,4) $\tan^{-1}\left(\frac{4}{3}\right) \approx 53^\circ$

Quadrant-I

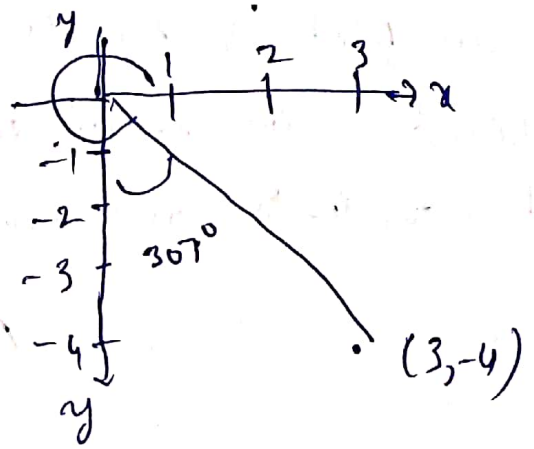


② Quadrant-IV, (3,−4)

$\tan^{-1}\left(-\frac{4}{3}\right) \approx -53^\circ$

the calculator returned negative angle.
But it is common to use positive value for the direction of a vector, add 360°

$-53 + 360^\circ = 307^\circ$



③

* The eigen vectors represent the directions for ~~the~~ where as eigen values represent the magnitudes for the directions.