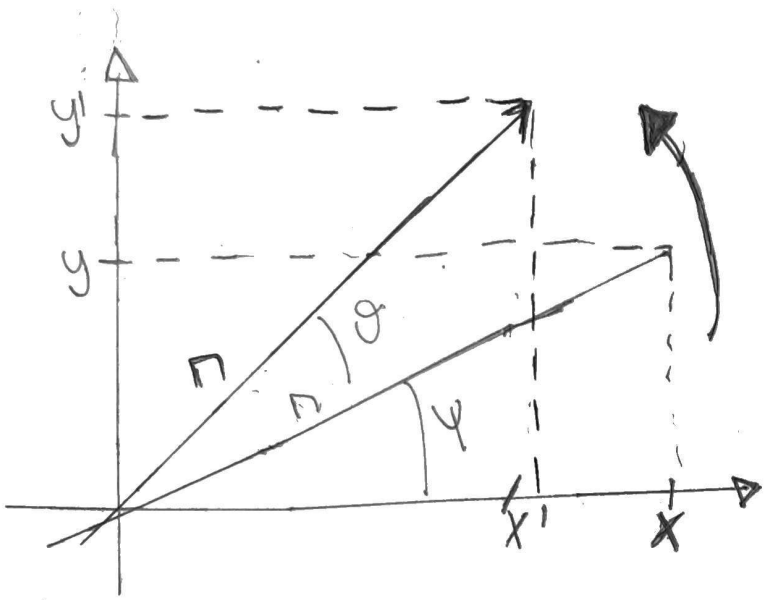
Rotation matrices:



$$R_\theta \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x' \\ y' \end{pmatrix}$$

R_θ

$$\begin{pmatrix} \cos\theta & -\operatorname{sen}\theta \\ \operatorname{sen}\theta & \cos\theta \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} x' \\ y' \end{pmatrix}$$

Rotation matrix

Trigonometria básica

$$\Rightarrow \quad x' = r\cos(\psi + \theta)$$

$$y' = r\operatorname{sen}(\psi + \theta)$$

$$x' = r(\cos\psi\cos\theta - \operatorname{sen}\psi\operatorname{sen}\theta)$$

$$y' = r(\operatorname{sen}\psi\cos\theta + \cos\psi\operatorname{sen}\theta)$$

$$x' = x\cos\theta - y\operatorname{sen}\theta$$

$$y' = y\cos\theta + x\operatorname{sen}\theta$$