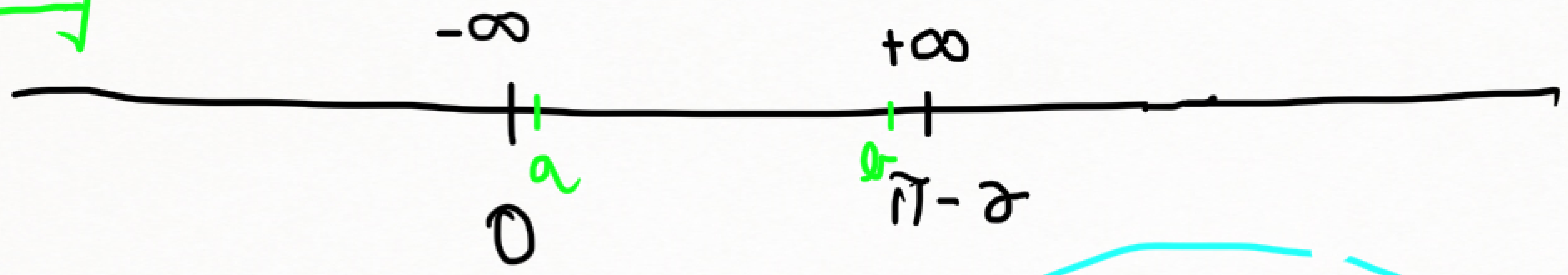
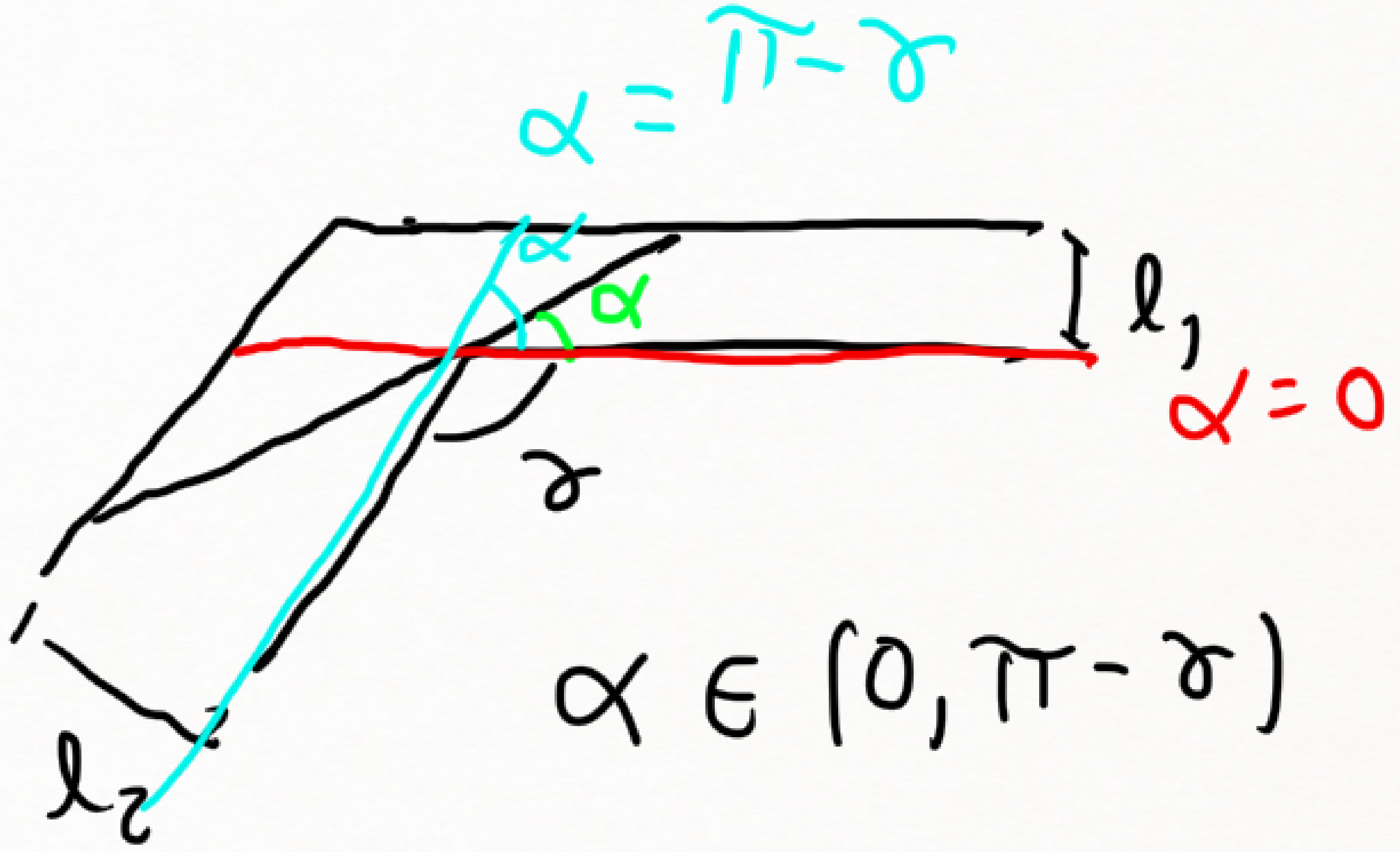
$$F(\alpha) = \frac{l_2 \cos(\pi - \gamma - \alpha)}{\operatorname{sen}(\pi - \gamma - \alpha)^2} - \frac{l_1 \cos(\alpha)}{\operatorname{sen}(\alpha)^2}$$

sup. $\gamma \neq \pi/2$

$$\alpha = \frac{\pi}{2} \rightarrow F(\alpha) = \frac{l_2 \cos\left(\frac{\pi}{2} - \gamma\right)}{\operatorname{sen}\left(\frac{\pi}{2} - \gamma\right)^2}$$

$$\boxed{\begin{array}{l} F(a) < 0 \\ F(\gamma) > 0 \end{array}}$$




$\alpha \in (0, \pi - \gamma)$

$\pi - \gamma$

$$\alpha \rightarrow 0 \quad F(\alpha) = \frac{l_2 \cos(\pi - \gamma - \alpha)}{\operatorname{sen}(\pi - \gamma - \alpha)^2} - \frac{l_1 \cos(\alpha)}{\operatorname{sen}(\alpha)^2} \Rightarrow F(\alpha) \rightarrow -\infty$$

$$\frac{l_2 \cos(\pi - \gamma)}{\operatorname{sen}(\pi - \gamma)^2}$$

$\infty$

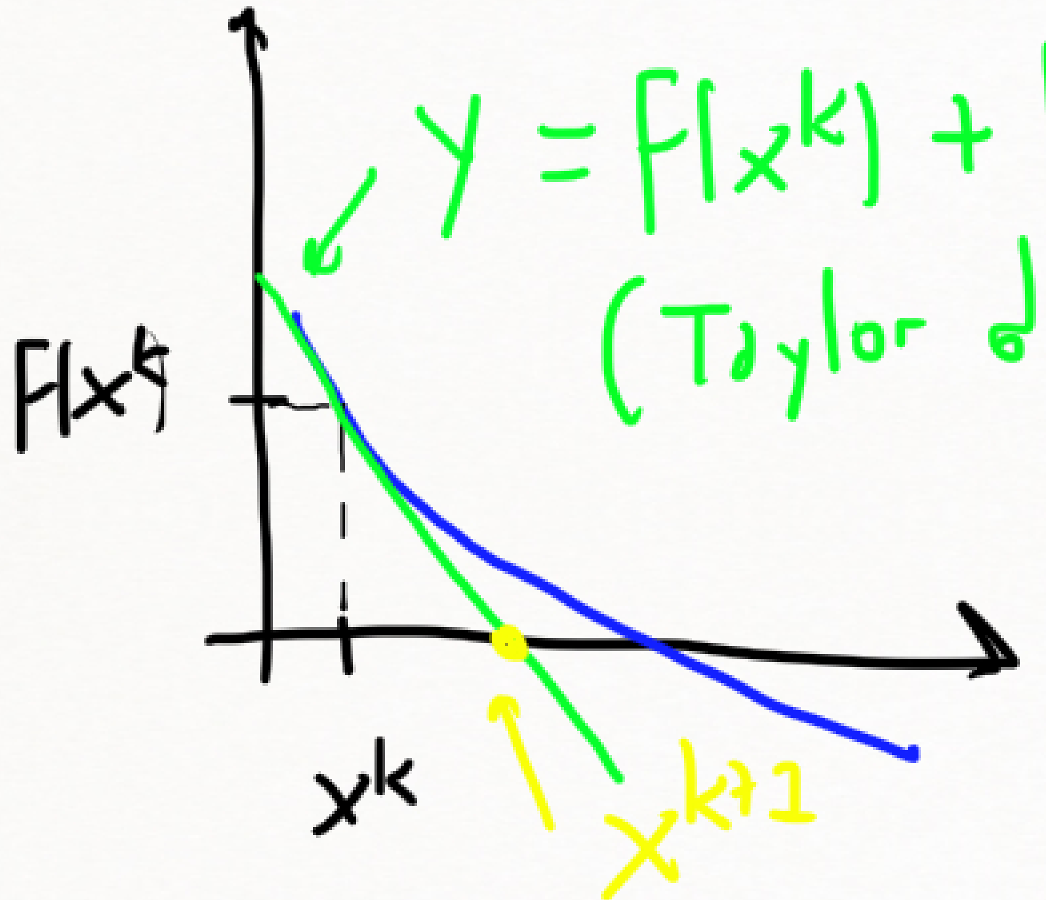
Análogamente

$\alpha \rightarrow \pi - \gamma \quad F(\alpha) \rightarrow +\infty$

## NR una variable

$x^k \rightarrow F(x^k),\ F'(x^k)$

armamos la recta tangente y le hallamos la raíz.




$$y = F(x^k) + F'(x^k)(x - x^k)$$

(Taylor de orden 1)

$$y = 0 \Rightarrow x = x^{k+1} = x^k - \frac{F(x^k)}{F'(x^k)}$$

pasar dividiendo

## NR varias variables $\quad F: \mathbb{R}^n \rightarrow \mathbb{R}^n$

$x^k \in \mathbb{R}^n \rightsquigarrow F(x^k),\ J_F(x^k) \leftarrow$ matriz $n \times n$

"plano tangente", "transformación lineal tangente"

(Taylor de orden 1 de F)

$$y = F(x^k) + J_F(x^k)(x^{k+1} - x^k) = 0$$

$$\Longleftrightarrow J_F(x^k)\underbrace{(x^{k+1} - x^k)}_{d^{k+1}} = -F(x^k)$$

$$\underbrace{J_F(x^k)}_{\substack{\text{matriz} \\ n \times n}} \underbrace{d^{k+1}}_{\substack{\text{incógnitas} \\ \mathbb{R}^n}} = \underbrace{-F(x^k)}_{\mathbb{R}^n}$$

resolvemos sist. lineal de ecuaciones.

$$x^{k+1} = x^k + d^{k+1}$$

$$F(x,y) = \begin{array}{cc} \begin{pmatrix} x^2 + xy^3 - 9 \\ 3x^2y - y^3 - 4 \end{pmatrix} & \begin{array}{c} F_1 \\ F_2 \end{array} \end{array} \qquad F: \mathbb{R}^2 \to \mathbb{R}^2$$

$$J_F(x,y) = \begin{pmatrix} \frac{\partial F_1}{\partial x} & \frac{\partial F_1}{\partial y} \\ \frac{\partial F_2}{\partial x} & \frac{\partial F_2}{\partial y} \end{pmatrix} = \begin{pmatrix} 2x + y^3 & 3xy^2 \\ 6xy & 3x^2 - 3y^2 \end{pmatrix}$$