

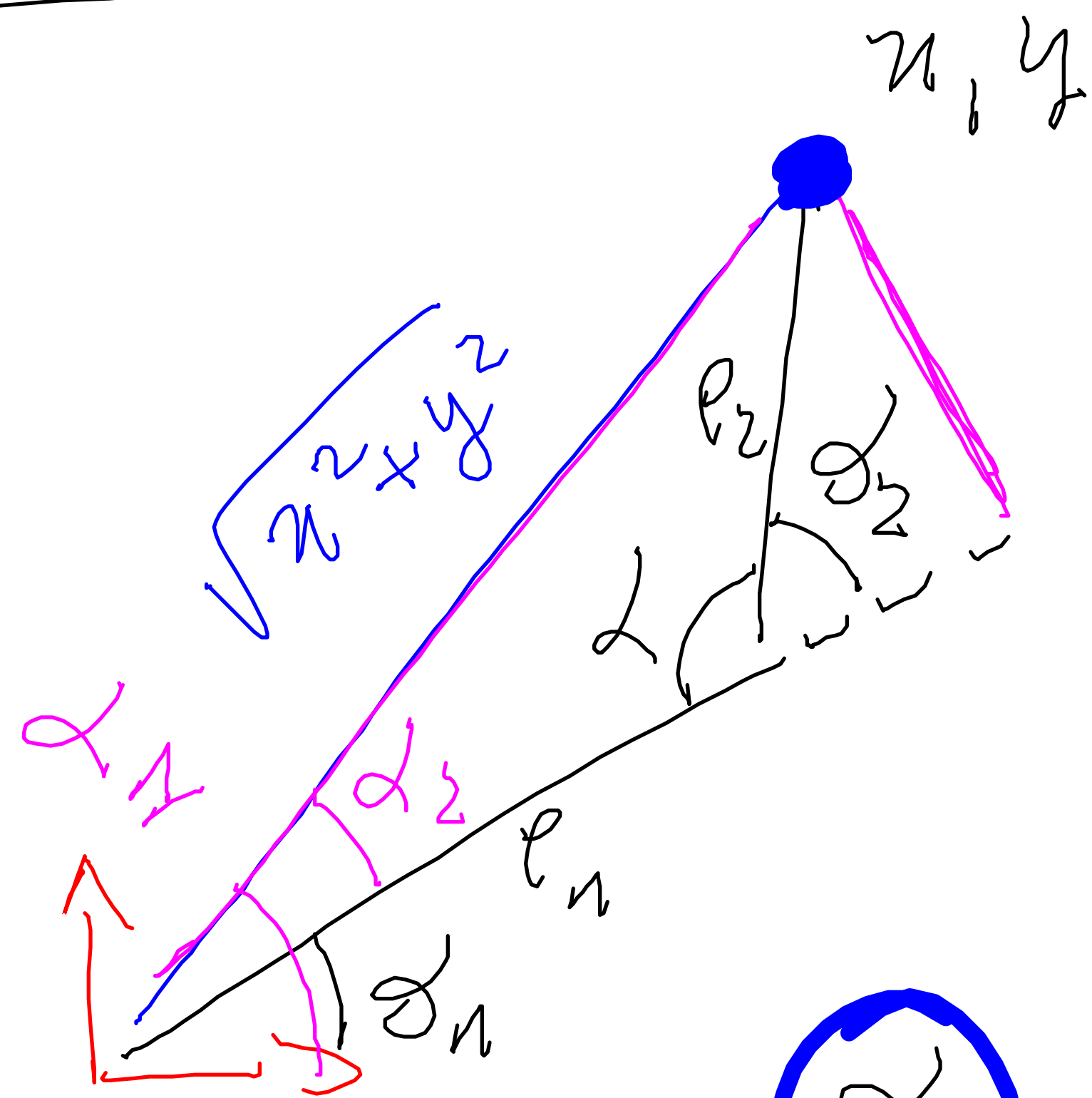
$$\underline{u = K(q)} \quad q = \begin{Bmatrix} \theta_1 \\ \theta_2 \end{Bmatrix}$$

$$\dot{u} = J \dot{q} \quad J = J(q)$$

AN. CINEM. INV.

$$\vec{u} = \vec{p} = \begin{Bmatrix} x \\ y \end{Bmatrix} \rightarrow q = \begin{Bmatrix} \theta_1 \\ \theta_2 \end{Bmatrix}$$

xy note



Law of Cosines \rightarrow

$$x^2 + y^2 = l_1^2 + l_2^2 - 2l_1 l_2 \cos \alpha$$

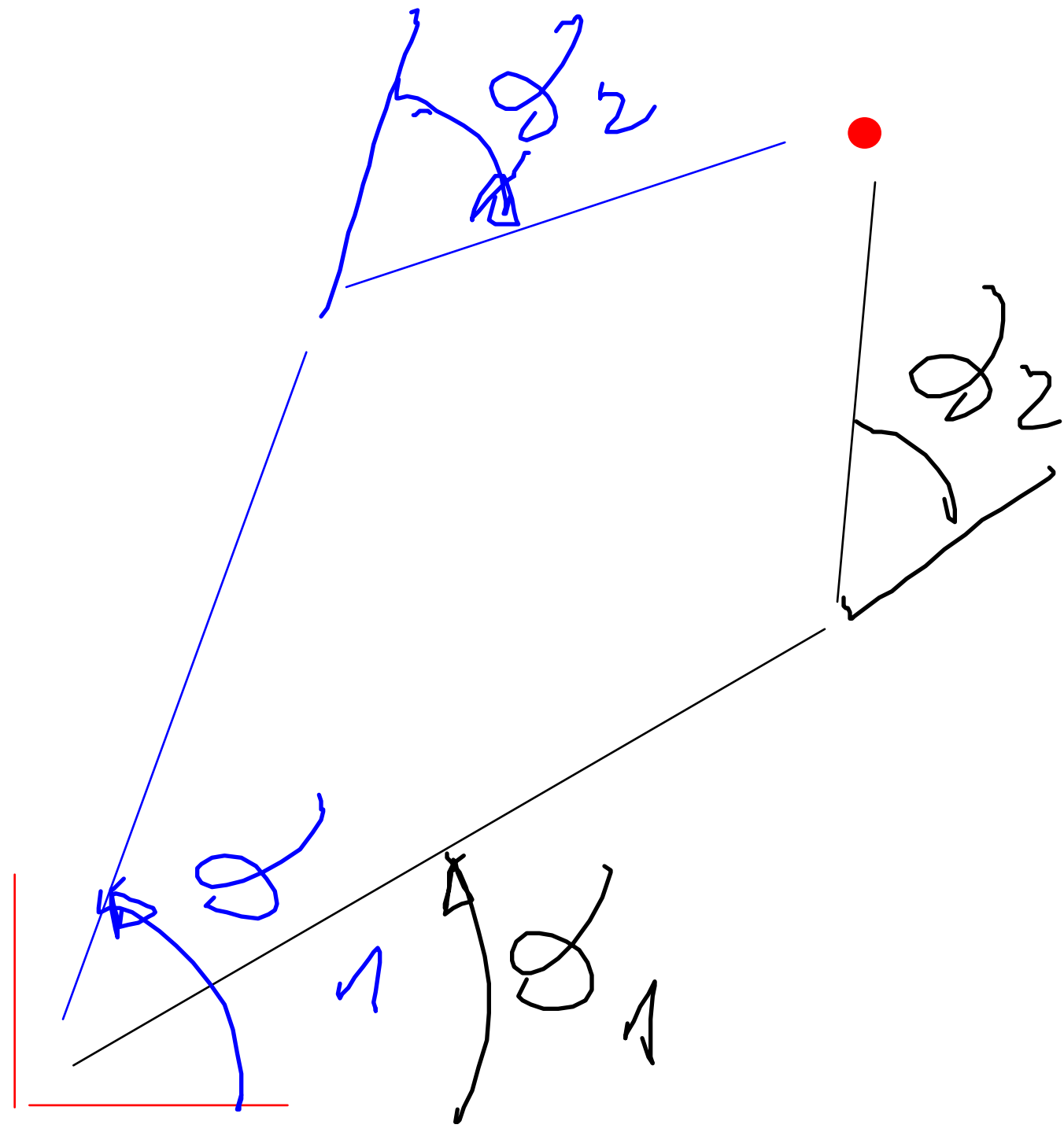
\uparrow
 $180^\circ - \theta_2$

θ_2

$\theta_1 = \theta_1 - \theta_2$

$\tan^{-1}\left(\frac{y}{x}\right)$

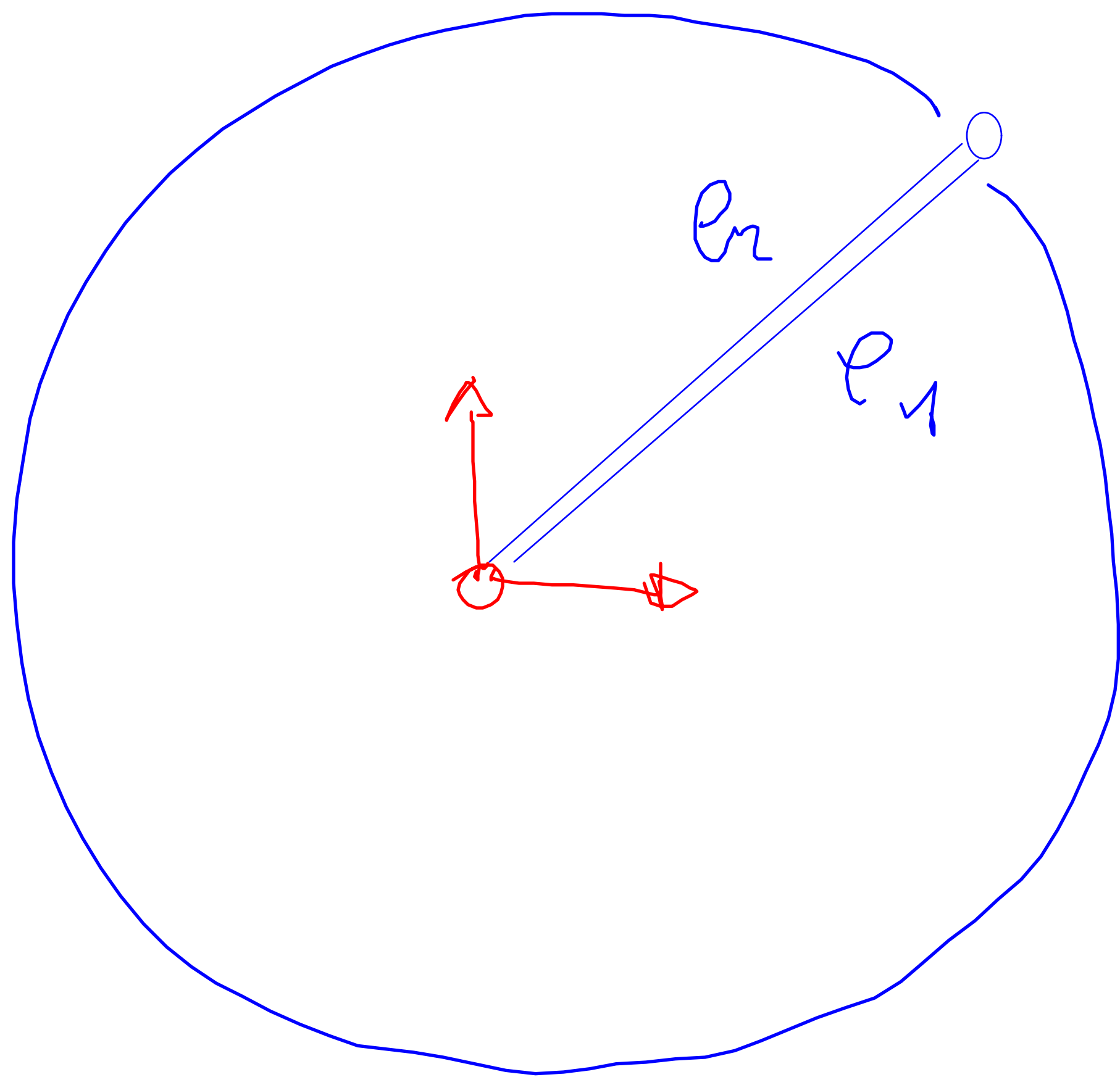
$\tan^{-1}\left(\frac{l_2 \sin \theta_2}{\sqrt{x^2 + y^2}}\right)$



$$\underline{\ell_1 = \ell_2}$$

$$\underline{x = 0}$$

$$\underline{y = 0}$$



$$\dot{x} = \underline{J} \dot{q} \quad \rightarrow \quad \dot{q} = \underline{\underline{J^{-1}}} \dot{x}$$

$\hookrightarrow \det(J) = 0$

conf. di
singolarità