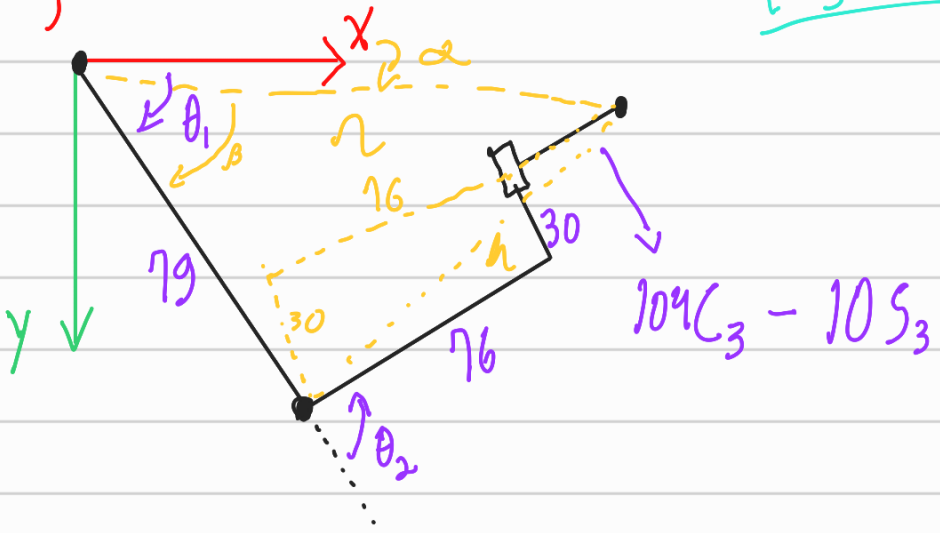
* Solução cotovelo direito: $(\theta_3 \to \theta_1 \to \theta_2)$



$$\to r = \sqrt{x^2 + y^2}$$

$$\to \alpha = \operatorname{atan2}(x, y)$$

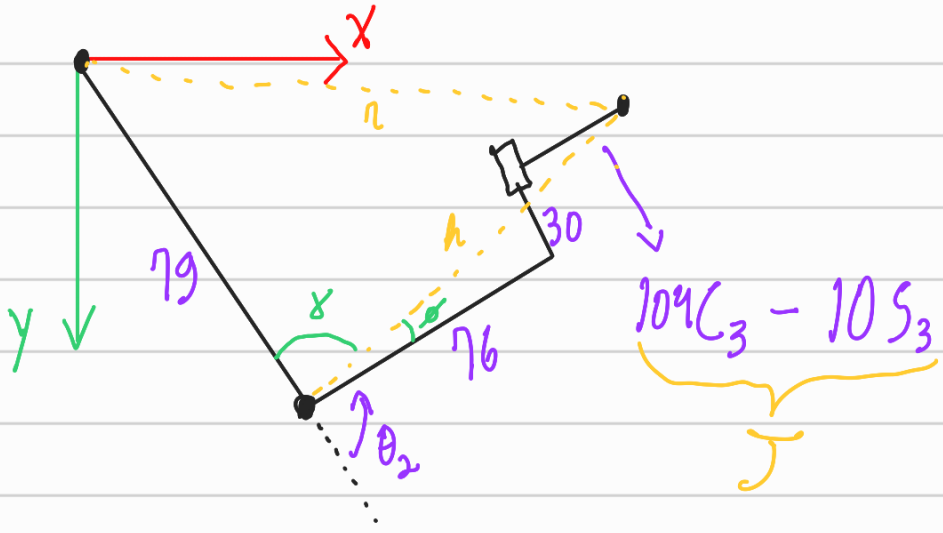
$$\to h = \sqrt{30^2 + (76 + 104C_3 - 10S_3)^2}$$

$$\to h^2 = r^2 + 79^2 - 2r \cdot 79 \cos(\beta)$$

$$\cos(\beta) = \frac{r^2 + 79^2 - h^2}{2r \cdot 79}$$

$$\beta = \operatorname{atan2}\left(C_\beta, \sqrt{1 - C_\beta^2}\right)$$

$$\Rightarrow \theta_1' = \alpha + \beta$$

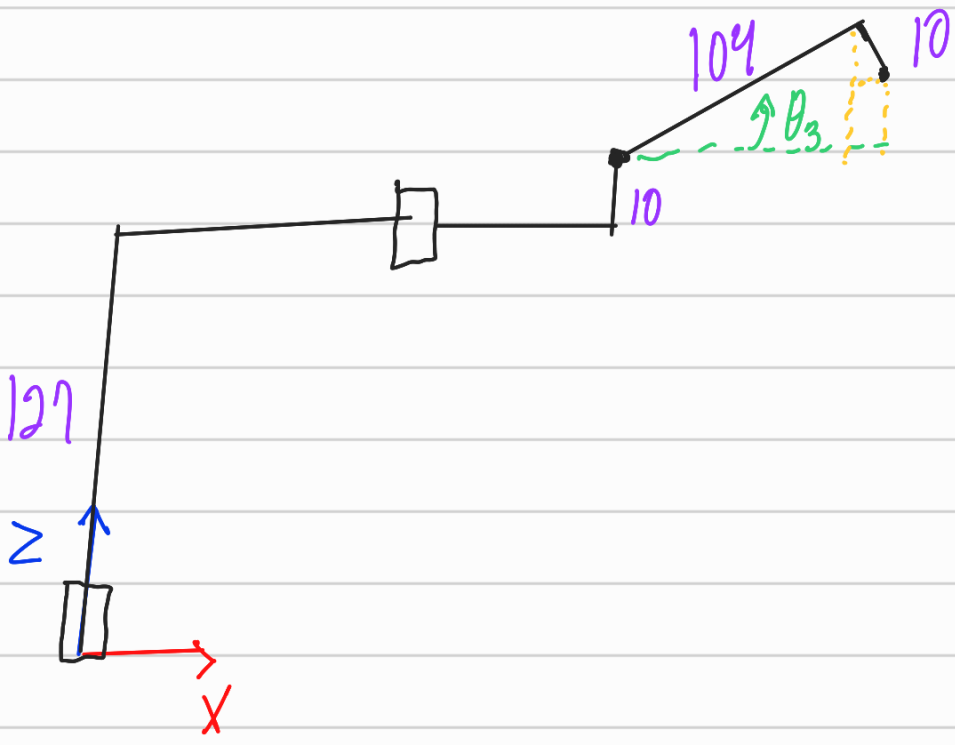


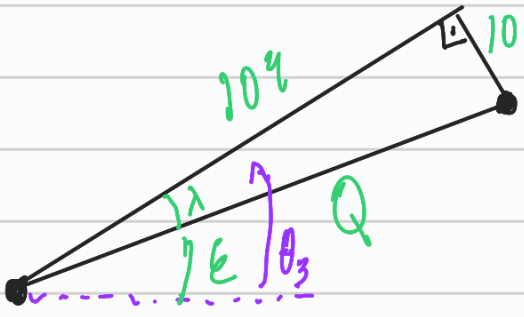
$\rightarrow \phi = atan2(|76+J|, 30)$

$\rightarrow \cos|\gamma| = \frac{79^2 + h^2 - n^2}{2 \cdot 79 \cdot h}$

$\rightarrow \gamma = atan2(C\gamma, \sqrt{1 - C\gamma^2})$

$\rightarrow \theta_2' = 180 - \gamma - \phi$





$$\rightarrow Q = \sqrt{104^2 + 10^2} = 104,48$$

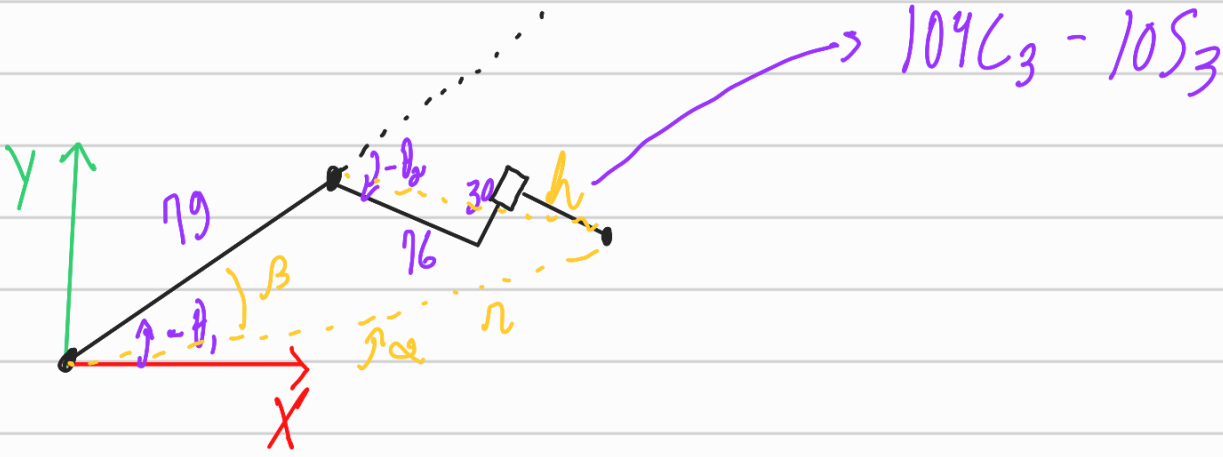
$$\rightarrow \lambda = \operatorname{atan2}(104, 10)$$

$$\rightarrow \frac{z - 127 - 10}{Q} = \operatorname{sen}(\varepsilon)$$

$$\rightarrow \varepsilon = \operatorname{atan2}(\sqrt{1 - S\varepsilon^2}, S\varepsilon)$$

$$\rightarrow \theta_3' = \lambda + \varepsilon$$

* Solução Cotovelo Esquerdo:



→ $104C_3 - 105_3$

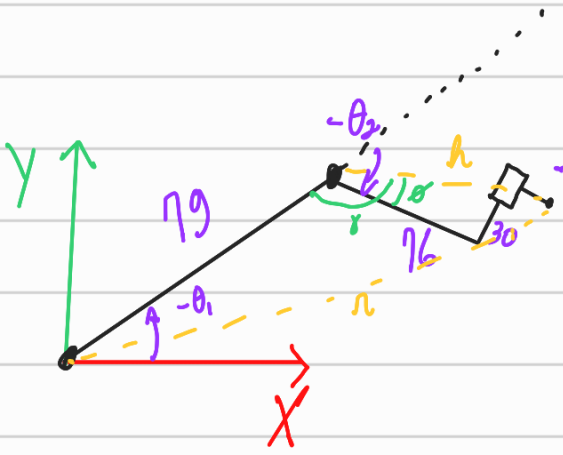
→ $n = \sqrt{x^2 + y^2}$

→ $\alpha = \text{atan2}(x, y)$

→ $h = \sqrt{30^2 + (76 + 104C_3 - 105_3)^2}$

→ $\cos(\beta) = \frac{79^2 + n^2 - h^2}{2 \cdot 79 \cdot n}$

→ $\theta_1'' = -(\alpha + \beta)$



$\rightarrow 104C_3 - 105S_3$

J

$\rightarrow \alpha = atan2(76, 30)$

$\rightarrow \cos(\gamma) = \frac{79^2 + h^2 - n^2}{2 \cdot 79 \cdot h} \rightarrow$

$\rightarrow \gamma = atan2(C_\gamma, \sqrt{1 - C_\gamma^2})$

$\rightarrow -\theta_2 + \gamma - \alpha = 180 \rightarrow \theta_2'' = \gamma - \alpha - 180$

$\theta_3'' = \theta_3'$