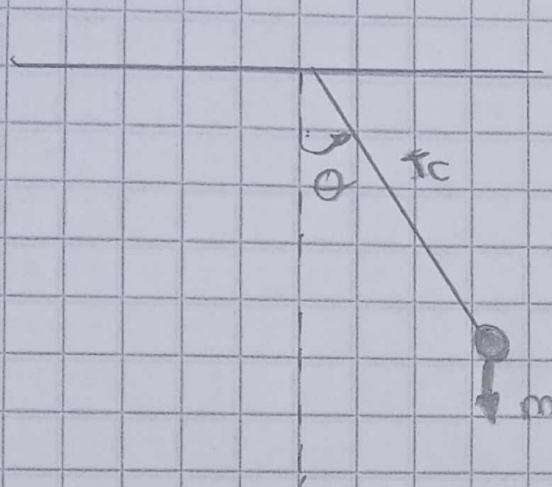

$J = ml^2$

$J\ddot{\theta} = T_c - mg.l\,sen\theta$

$\ddot{\theta} = \frac{T_c}{J} - \frac{mgl}{J} sen\theta = \frac{T_c}{ml^2} - \frac{g}{l} sen\theta$

Definindo estados:

$q_1 = \theta \qquad q_2 = \dot{q}_1 \qquad \dot{q}_2 = \frac{U}{ml^2} - \frac{g}{l} sen\, q_1$

$U = T_c$

$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -\frac{g}{l} sen\, q_1 & 0 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \end{bmatrix} + \begin{bmatrix} 0 \\ \frac{1}{ml^2} \end{bmatrix} U$$

Se deseja conocer q_1

$$y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \end{bmatrix} + \bar{0}\, U$$