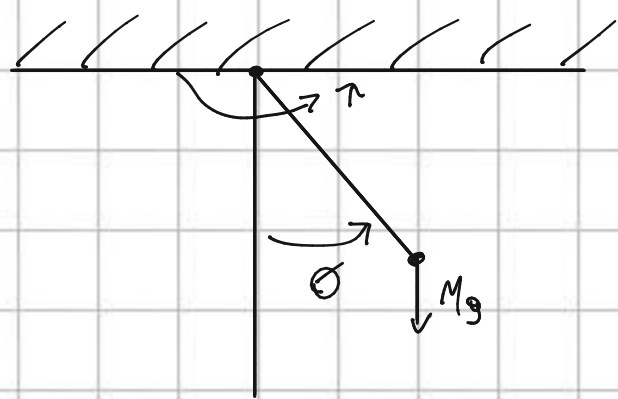


tarea 4b



$$I = ml^2$$

$$T_c - m g \cdot l \sin \theta = I \ddot{\theta} \rightarrow \text{Reemplazar } I$$

$$T_c - m g l \sin \theta = (ml^2) \ddot{\theta}$$

$$\ddot{\theta} = \frac{T_c}{ml^2} - \frac{m g l}{ml^2} \sin \theta$$

$$\ddot{\theta} = \frac{T_c}{ml^2} - \frac{g}{l} \sin \theta$$

tenemos

$$\theta = q_1$$

$$\dot{q}_2 = \dot{\theta} = \dot{q}_1$$

$$\ddot{q}_2 = \ddot{\theta} = \ddot{q}_1$$

$$\ddot{\theta} = \frac{T_c}{ml^2} - \frac{g}{l} \theta \rightarrow \text{aproximar } \sin \theta \rightarrow \theta$$

$$\ddot{q}_2 = \frac{T_c}{ml^2} - \frac{g}{l} q_1$$

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

$$y = \theta = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \end{bmatrix} + \begin{bmatrix} 0 \end{bmatrix} T_c$$