

Total Energi Kinetik :

$$T_1 + T_2 = \frac{1}{2} m \dot{x}_4^2 + m x_2 \dot{x}_4 \cos x_1 + \frac{1}{2} m l^2 \dot{x}_2^2 + \frac{1}{2} M \dot{x}_4^2$$

Total Energi Potensial $V = mgY = mgl(\cos \theta(t))$
 $= mgl \cos x_1$

Lagrangian $L = T - V$

$$L = \frac{1}{2} (M+m) \dot{x}_4^2 + m l \dot{x}_2 \dot{x}_4 \cos x_1 + \frac{1}{2} m l^2 \dot{x}_2^2 - mgl \cos x_1$$

Persamaan Lagrangian :

$$(1) \frac{d}{dt} \left[\frac{\partial L}{\partial \dot{x}_1} \right] - \frac{\partial L}{\partial x_1} = 0$$

tidak ada
Torque external

$$(2) \frac{d}{dt} \left[\frac{\partial L}{\partial \dot{x}_4} \right] - \frac{\partial L}{\partial x_3} = F(t)$$

Gaya $F(t)$
external.