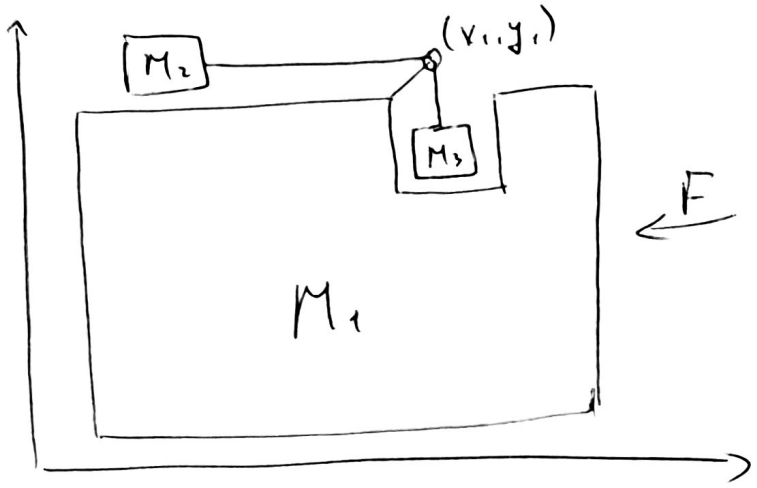
Mechanics Section B

Samvel Petrosyan

Project 2



Parameters that we have

$M_0 = 0$; $M_1, M_2, M_3 \in (0, 10]$

$\mu_1, \mu_2, \mu_3 \in [0, 0{,}5]$

$F \in [-300N, 300N]$

$g = 10\, m/s^2$

Forces on $M_1 \rightarrow F = ma(M_1) = (m_1 + m_2 + m_3)\, a_1(M_1)$

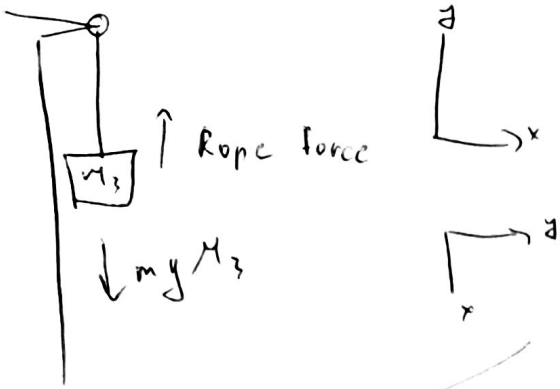
Acc of $M_1 \rightarrow a_1 = \dfrac{F}{(m_1 + m_2 + m_3)(M_1)}$.

distance of $M_1 \rightarrow d = V_0 t + \frac{1}{2} a (t)^2 = 0\,(t_1) + \frac{1}{2} a_1 (t_1) = \frac{1}{2} a_1 (t_1) = D_0$

$d = V_{n-1}(T_n) + \frac{1}{2} a_n (T_n)^2$

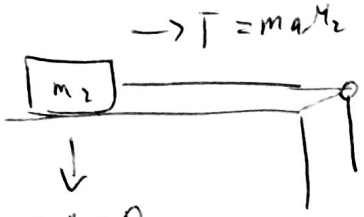
$\left(V_2 = \dfrac{d}{T_{n+1}} - \left(\left(\frac{1}{2}\right)(a_2)(T_{n+1})\right)\right.$ ← we get next distance from this formula $\Big| \rightarrow d = V_n T_{n+1} + \frac{1}{2} a_n (T_{n-1})^2$

M_3 forces



net force = $T - mg M_3$

net force = $mg M_3 - T$



$\rightarrow$ net force = $T = mg = ma M_2$

$\Downarrow$

Net force of $M_3 = m_3 a_3 M_3 - m_2 a_2 M_2 \Rightarrow a_2, a_3$ accelerations are =

$$\Rightarrow a_2 = a_3 = \frac{M_2 \cdot m_2 \cdot g}{(M_1 m_1) + (M_2 m_2)}$$

$$d = (V_0 \cdot t_n) + \frac{1}{2}(t_n)^2 a_{2,3} = \frac{1}{2}(t_n^2) a_{2,3}$$

Length of the rope = horizontal length + vertical length =

$= X_{1_0} - X_{2_0} + Y_{1_0} + Y_{3_0}$

X_1 pos = $Y_1 - (\text{disp. of } M_1)$ $X_2 pos = X_2 + (\text{disp } M_2) - (\text{disp } M_1)$.

X_3 pos = X_1 position. Y_3 pos = $Y_3 - (\text{disp} \cdot M_3)$.