Mechanics
Project 2
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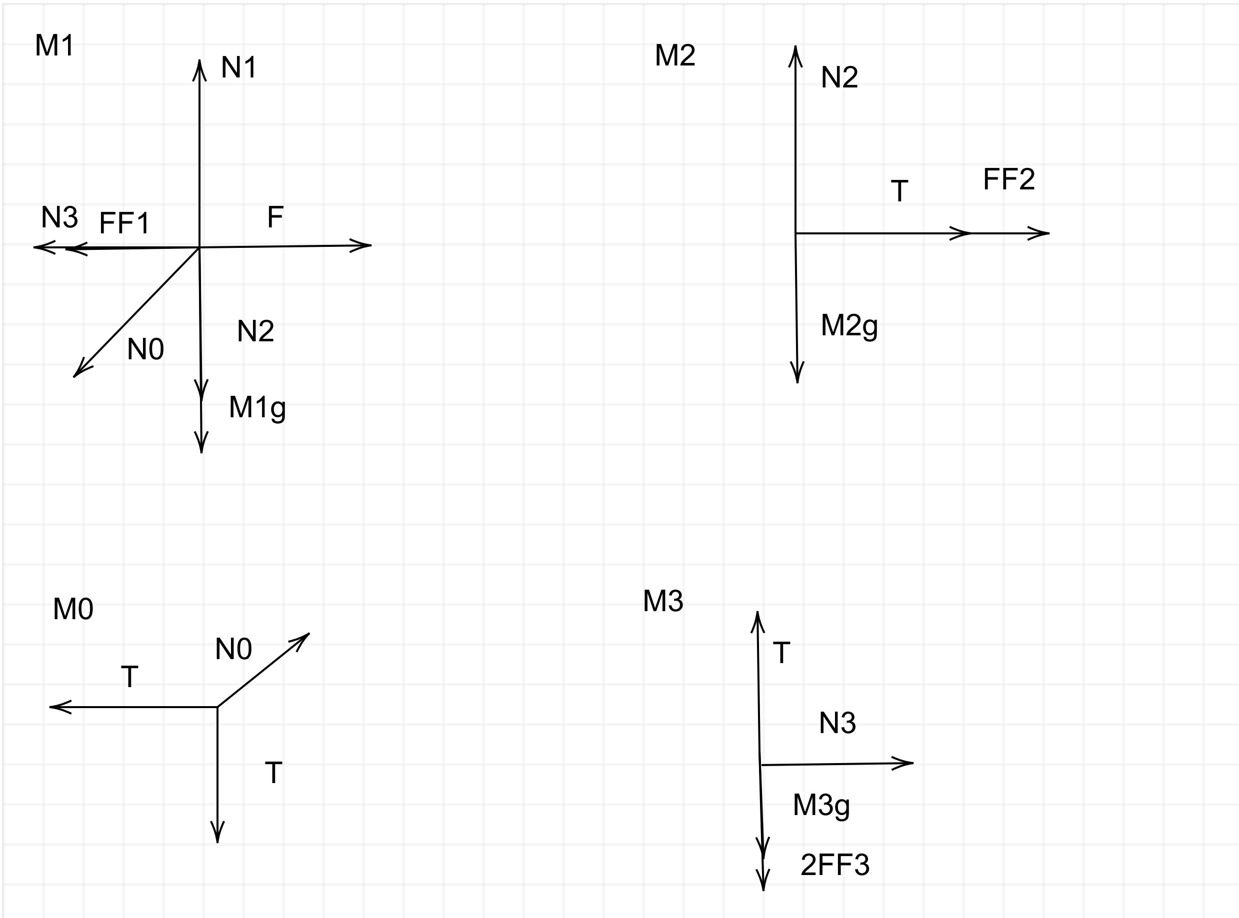

I have assumed F is positive

We have the following equations:

M_1 *in x direction* : $F - N_{0x} - F_{F1} - N_3 = M_1 a_1$
M_1 *in y direction* : $N_1 - M_1 g - N_2 - N_{0y} = 0$ (*doesn't move in y direction*)
M_2 *in x direction* : $F_{F2} + T = M_2 a_2$
M_2 *in y direction* : $N_2 - M_2 g = 0$
M_3 *in x direction* : : $N_3 = M_3 a_{3x}$
M_3 *in y direction* : $T - M_3 g - 2F_{F3} = M_3 a_{3y}$
M_0 *in x direction* : $N_{0x} - T = M_0 g = 0 \implies N_{0x} = T$
M_0 *in y direction* : $N_{0y} - T = M_0 g = 0 \implies N_{0y} = T$

$And\ the\ following\ constraints$

$The\ length\ of\ the\ rope\ is\ constant \implies a_1 - a_2 - a_{3y} = 0 \implies a_1 = a_2 + a_{3y}$
$M_3\ cannot\ escape\ the\ hole \implies a_1 = a_{3x}$

$From\ the\ system\ of\ equations\ we\ will\ get\ that$

$$a_1 = \frac{(M_3 + M_2)(F - \mu_1(M_1 + M_2)g) - M_2M_3g(1 - \mu_2)(1 - \mu_1)}{(M_1 + M_3)(M_3 + M_2) + (1 - \mu_1)(2\mu_3M_3 + M_3)M_2}$$

$$T = \frac{M_2M_3g + (2\mu_3M_3 + M_3)a_1M_2 - \mu_2M_2gM_3}{M_3 + M_2}$$

$$a_2 = \frac{T - M_3g - 2\mu_3M_3a_1 - M_3a_1}{-M_3}$$

$$a_{3y} = a_1 - a_2$$

$$a_{3x} = a_1$$

$by\ having\ a_1,\ a_2,\ a_{3y},\ a_{3x},\ M_1\ ,\ M_2\ ,\ M_3\ ,\ F_n,\ \mu_1\ ,\ \mu_2\ ,\ \mu_3\ ,\ x_1\ ,\ x_2\ ,\ x_3\ ,\ y_1\ ,\ y_2\ ,\ y_3\ ,\ t_n\ we$
$can\ find\ the\ coordinates\ after\ we\ use\ the\ F_n\ forces\ (\ see\ the\ code).$