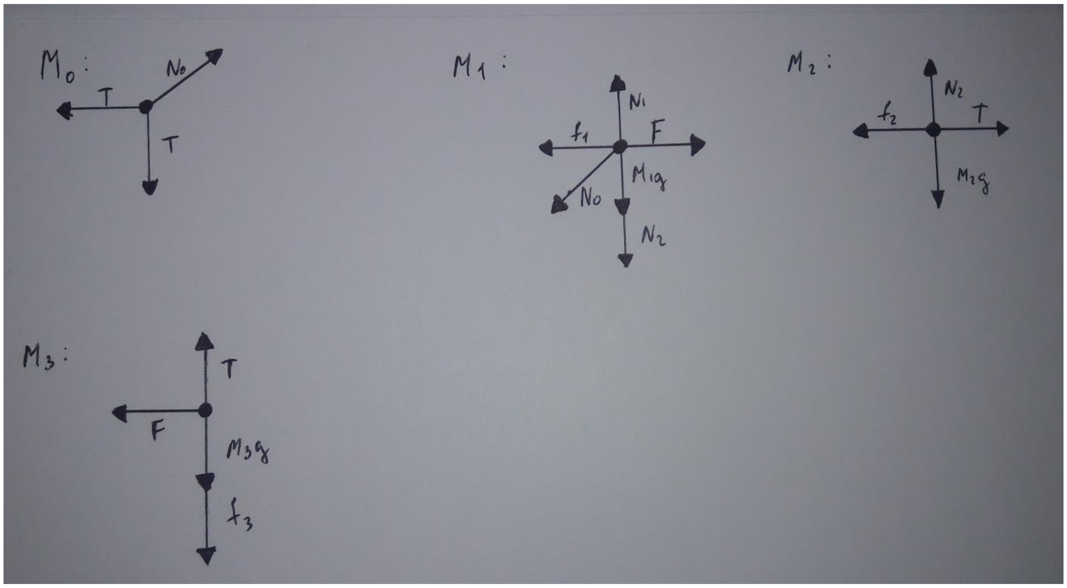
Mechanics Project 2 - Arpen Matinyan

1. Here is the force diagram for all the bodies.



   Where f1, f2 and f3 are the friction forces.
   f1 = μ1 * N1 = μ1 *(M1*g + M2*g + T)
   f2 = μ2 * M2 * g
   f3 = μ3 * F

2. Constraint equations.

$$a1 - a2 - a3y = 0$$
$$a1 = a3x$$

   Equations of motion.

$$M1*a1 = F - f1 - T$$
$$M2*a2 = T - f2$$
$$M3*a3y = T - M3*g - f3$$
$$-F1 = M3*a3x$$

3. The equations are solved. New position is computed using r(t) = r0 + v0t +a/2 * t^2.
4. Interesting cases are when M2 and M3 start to move, or when M1 moves as a result of the force applied by the pulley.
   When M1 is greater than M2 and M3, μ1=μ2=μ3=0.1
   For M3 to move vertically up the following condition must hold.

$$T > M3*g + f3$$

And meantime for M2 to move right : $T < \mu 2 * M2 * g$
So, if $M3*g + \mu 3 * F < \mu 2 * M2 * g$ holds => the bodies M2 and M3 will move.
When M1 is stable, M3 will go down if $M3> \mu 2 * M2$.

F = 100 N	a1 = -10.84 (-5.45 , 15)	a2 = -2.19 (0.92, 15)	a3x=-10.84, a3y=8.65 (-5.45, 8.35)
F = -50 N	a1 = 0.73	a2=4.02	a3x=0.73, a3y=3.29
M1 = 1 << M2,M3	a1 = 5.83	a2=5.93	a3x=5.83, a3y=0.10
M1 = M2 = M3,			