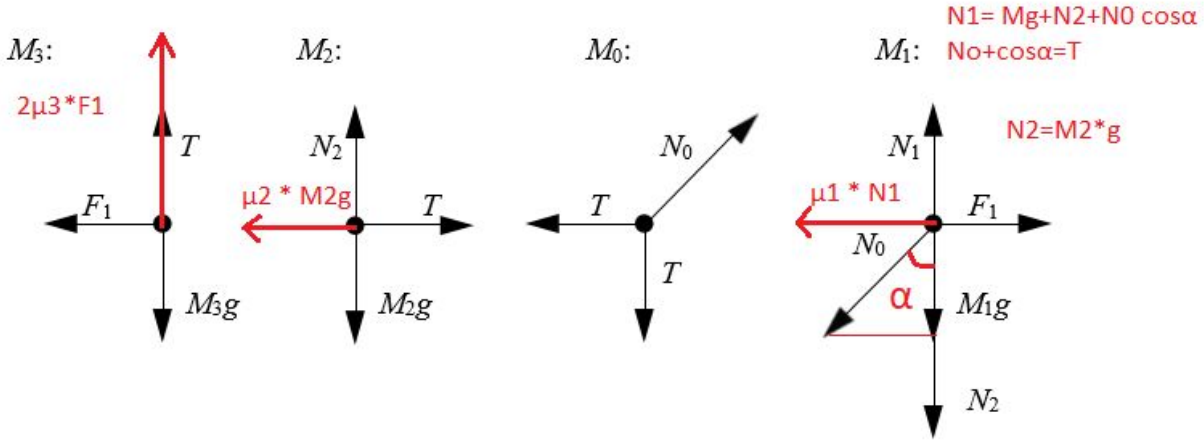
Margarita Zargaryan
Project 2 , explanation of the results used in coding part



Constraint 1: Lrope = Lhorizontal + Lvertical = x1 – x2 + y1 – y3 = const
$x1^{¨} - x2^{¨} + y1^{¨} - y3^{¨} = a1 - a2 - a3y = 0$
Constraint 2: M3 cannot leave the hole in M1 x1 = x3 $x1^{¨} = x3^{¨}$ a1 = a3x

For M1 in x : F1-T - μ1*M1*g - μ1*M1*g + μ1*T = M1a1
For M2 in x : T- μ2*M2*g = M2*a2
M3 in x: -F1 = M3*a(3x)
M3 in y: T- M3*g +2* μ3*F1= M3(a1-a2)
M0 in x : N0x – T = M0*a0 = 0
$a1 - a2 - a3y = 0$
a1 = a3x

-M3*a1 - M2*a2 + μ2*M2*g-μ1*M1*g+ μ1*(M2*a2+μ2*M2*g)= M1*a1
a1*(M1+M3) = - M2*a2 + μ2*M2*g-μ1*M1*g+ μ1*M2*a2+μ1*μ2*M2*g
a1=(- M2*a2 + μ2*M2*g-μ1*M1*g+ μ1*M2*a2+μ1*μ2*M2*g) / (M1+M2)

M2*a2 + μ2*M2*g-M3*g +2*μ3*F1 = M3(a1-a2)
M2*a2 + μ2*M2*g-M3*g +2*μ3*F1 = M3((- M2*a2 + μ2*M2*g-μ1*M1*g+ μ1*M2*a2+μ1*μ2*M2*g) / (M1+M2) -a2)

M2*a2 + μ2*M2*g-M3*g +2*μ3*F1= M3((- M2*a2 + μ2*M2*g-μ1*M1*g+ μ1*M2*a2 +μ1*μ2*M2*g - M1*a2-M3*a2) /(M1+M3))

(M1+M3)*(M2*a2 + μ2*M2*g-M3*g +2*μ3*F1) = M3*(- M2*a2 + μ2*M2*g-μ1*M1*g+ μ1*M2*a2

$$+\mu1*\mu2*M2*g - M1*a2-M3*a2)$$

$$a2*M2*(M1+M3)+(M1+M3)(\ \mu2*M2*g-M3*g +2*\mu3*F1) = a2*M3*(-M2+\ \mu1*M2-M1 - M3) + M3*(\mu2*M2*g - \mu1*M1*g +\mu1*\mu2*M2*g\ )$$

$$a2*(M2*(M1+M3) - M3*(-M2+\ \mu1*M2-M1 - M3)\ \ ) = -(M1+M3)\ *(\mu2*M2*g-M3*g +2*\mu3*F1) + M3*(\mu2*M2*g - \mu1*M1*g +\mu1*\mu2*M2*g)$$

$$a2 = (\ -(M1+M3)\ *(\mu2*M2*g-M3*g +2*\mu3*F1) +\ \ M3*(\mu2*M2*g - \mu1*M1*g +\mu1*\mu2*M2*g)\ )\ /\ (M2*(M1+M3) - M3*(-M2+\ \mu1*M2-M1 - M3))$$

As $x(t) = x0+ v0t +½ *(a* t^2)$
As starting from position 0 , with 0 velocity => $x(t) = ½ *(a* t^2)$