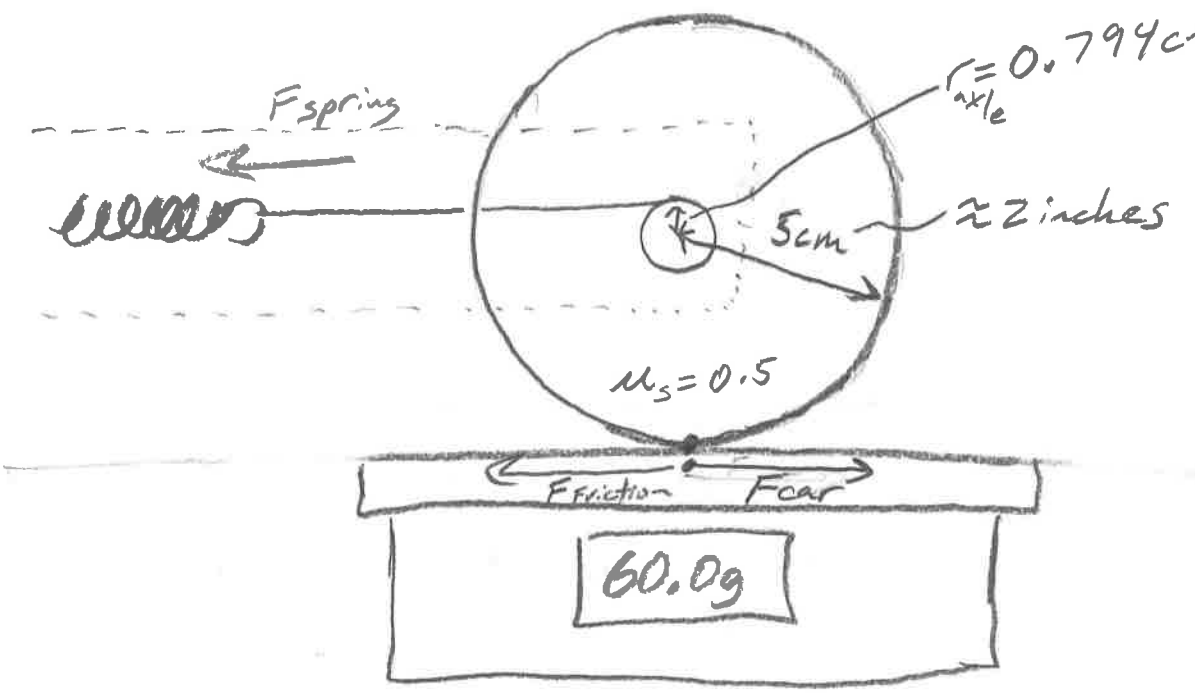


1.) a) $F_{Friction} = \mu_s(F_N) = \mu_s(mg) = 0.5(0.06kg)(9.8 m/s^2)$

$F_{Friction} = 0.294N = Max\ F_{car}$

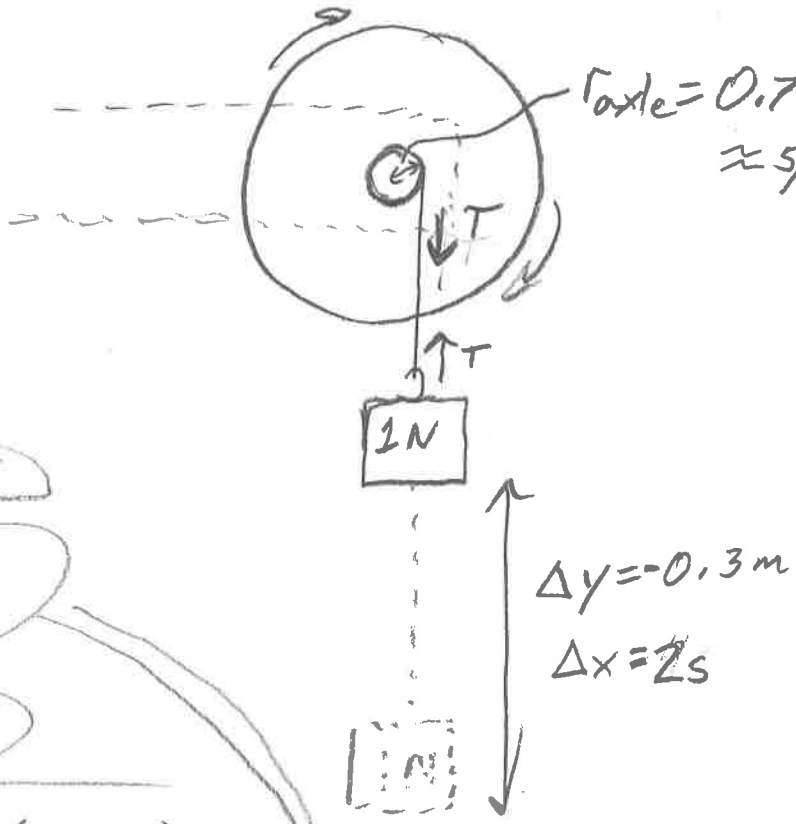
b) $Max\ \tau = F_r = 0.294N(0.05m) = 0.0147\,N \cdot m$

c) $Max\ F_{spring} \Rightarrow \tau_{max} = F_{spring} r_{axle}$

$0.0147\,N \cdot m = F_{spring}(0.00794m)$

$Max\ F_{spring} = 1.85N$

2.



a) $\Delta y = \frac{1}{2} a t^2$

$-0.3m = \frac{1}{2} a (2s)^2$

$a = -0.15\,m/s^2$

b) $\Sigma F_{y\,1N\,mass} = T - w$

$\Sigma F_{y\,1N\,mass} = ma$

$\Sigma F_{y\,1N\,mass} = \left(\frac{1N}{9.8\,m/s^2}\right)\left(-0.15\,m/s^2\right)$

$= -0.0153N$

$-0.0153N = T - 1N$

$T = 0.984N$

c) $rF = \tau = I\alpha \qquad \alpha = \frac{a}{r}$

$0.00794m\,(0.984N) = I\left(\frac{-0.15\,m/s^2}{0.00794m}\right)$

$I = 0.000412\,kg\,m^2/s^2$

Moment of inertia (I) can't be negative