1) —○ $m_r = 6.67\ kg$ $L = 5.4\ m$ $m_s = 33.35\ kg$ $R = 1.35\ m$

a) $I_{stick} = \frac{1}{3}MR^2$ $I_{sphere} = \frac{2}{5}MR^2$

$I_{tot} = I_{stick} + I_{stick_L} + I_{sphere} + I_{sphere_L}$

$= \frac{1}{3}(6.67)(2.7)^2 + (6.67)(2.7)^2 + \frac{2}{5}(33.35)(1.35)^2 + (33.35)(5.4+1$

$= 1608.65\ kg\,m^2$

b) $F = 407\ N$ ⊥ @ center of rod. $\tau = rF\sin\theta$ $\frac{\tau}{I} = \alpha$

$\alpha = \frac{2.7(407)\sin 90°}{1608.65} = 0.683177\ rad/s^2$

c) $CM = 6.075\ m$

○—— $I = I_r + I_s = I_{r_{cm}} + I_{r\parallel axis} + I_{s_{cm}} + I_{s\parallel axis}$

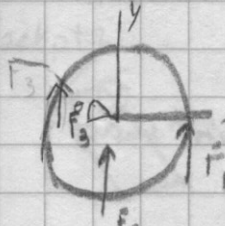
$= \frac{1}{3}(6.67)(2.7)^2 + (6.67)(3.375)^2 + \frac{2}{5}(33.35)(1.35)^2 + (33.35)$

$= 131.69\ kg\,m^2$

f)

$I = I_r + I_s = \frac{1}{3}(6.67)(2.7)^2 + 6.67(5.4)^2 + \frac{2}{5}(33.35)(1.35)^2 + 33.35($

3)



$m = 8.67\ kg$ $R = 1.39$ $F_1 = 303\ N$ $F_2 = 303\ N$ $F_3 = 303$ $\theta = 35°$

a) $\tau_1 = rF\sin\theta$

$= (303)(1.39)\sin 90° = 421.17\ Nm$

b) $\tau_2 = 0$ c) $\tau_3 = (1.39)(303)\sin(90-35°) = 345\ N$

e+d) $\tau_{net} = \Sigma\tau = \tau_1 - \tau_3 = 76\ Nm$ Torque is only in the z direction!

f)

g) $\alpha = \frac{\tau}{I} = \frac{76}{\frac{1}{2}ML^2} \approx 9.09\ rad/s^2$

h) $K = \frac{1}{2}I\omega^2 \rightarrow 0.5\cdot(0.5\cdot 8.67\cdot 1.39^2)\cdot(\alpha\cdot 1.8)^2 = 68.5509\ J$