50. $I = ?$ $\quad \tau = 32\,Nm$

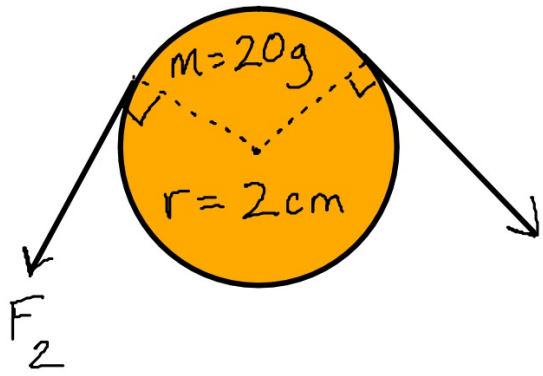
$\alpha = 25\,rad/s^2$

$$\alpha = \frac{\Sigma \tau}{I} \qquad I = \frac{\Sigma \tau}{\alpha}$$

$$= \frac{32}{25}$$

$$I = 1.28\,kgm^2$$

53. $F_2 = ?$



$t = 1.25\,s$

$\omega_0 = 0$

$\omega_f = 250\ rad/s$ CCW

$F_1 = 0.100\ N$

1. $\alpha = ?$ $\quad \dfrac{\omega_f - \omega_0}{t} = \alpha = \dfrac{250\ rad/s}{1.25\,s} = 200\ rad/s^2$

2. $\sum \tau = I\alpha \qquad I = \frac{1}{2} m r^2$

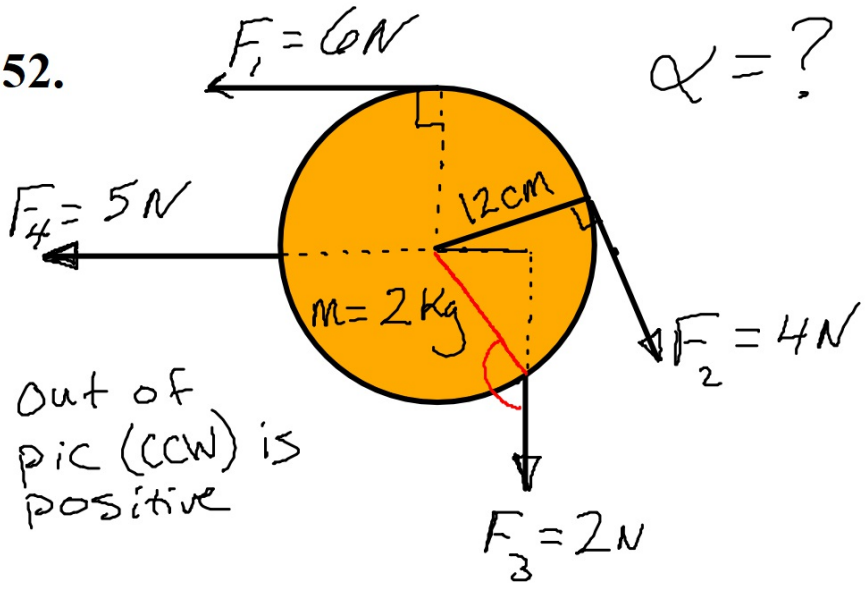
$$r \times F_2 - r \times F_1 = \left(\frac{1}{2} m r^2\right)(\alpha)$$

$$(r)F_2 \sin 90^\circ - r F_1 \sin 90^\circ = \frac{1}{2} m r^2 (\alpha)$$

$$F_2 - 0.1 = \frac{1}{2}(0.02)(0.02)(200)$$

$$F_2 = 0.14\,N$$

52.



Out of pic (CCW) is positive

$\alpha = ?$ $\alpha = \frac{\Sigma \tau}{I}$

$I = \frac{1}{2} m r^2$

$$\alpha = \frac{R \times F_1 - R \times F_2 - r \times F_3}{\frac{1}{2} m R^2}$$

$$= \frac{(0.12)(6) - (0.12)(4) - (0.05)(2)}{\frac{1}{2}(2)(0.12)^2}$$

$$\alpha = \frac{0.14}{0.0144} = 9.72\ \text{rad/s}^2 \quad \text{CCW or +}$$

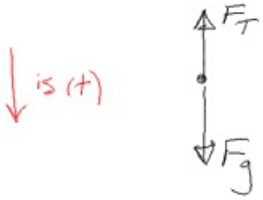
51. a) $a=?\quad v_i=0\quad \Delta y=0.75\quad t=5s$

$\Delta y = v_i t + \frac{1}{2}at^2$

$0.75 = 0 + \frac{1}{2}(a)5^2$

$a = 0.06 m/s^2$

b) $F_T = ?$ (on right)



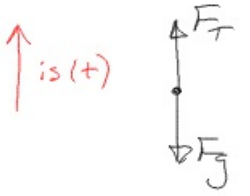
$F_g - F_T = ma$

$F_T = F_g - ma$

$F_T = 4.9 - (0.5)(0.06)$

$F_{T_R} = 4.87 N$

c) $F_T = ?$ **(left)**



$F_T - F_g = ma$

$F_T = ma + mg$

$= (0.46)(0.06) + (0.46)9.8$

$F_{T_L} = 4.54 N$

d) $\alpha = ?$

$a_t = \alpha r \quad \alpha = \frac{a_t}{r} = \frac{0.06}{0.05}$

$\alpha = 1.2 rad/s^2$

e) $I = ?$

$\alpha = \frac{\Sigma \tau}{I} \quad I = \frac{\Sigma \tau}{\alpha}$

$I = \frac{\vec{r} \times \vec{F}_{T_R} - \vec{r} \times F_{T_L}}{\alpha}$

$= \frac{(0.05)(4.87) - (0.05)(4.54)}{1.2}$

$I = 0.0138 kgm^2$