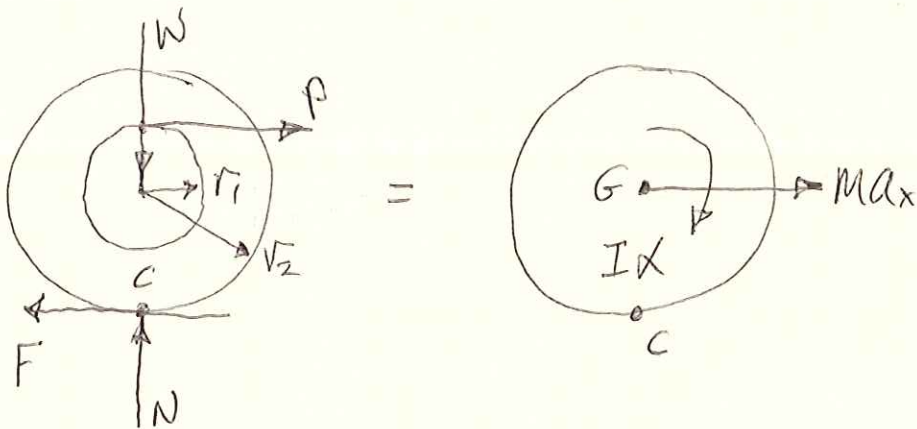


PROB. 16-99

$$r_1 = \frac{1}{3} \text{ ft}, \quad r_2 = \frac{2}{3} \text{ ft}, \quad W = 10 \text{ LB}, \quad k = \frac{1}{2} \text{ ft}, \quad P = 5 \text{ LB},$$

$$\mu_s = 0.25, \quad \mu_k = 0.2$$

DETERMINE IF DSK SLIDES, α , a_x



FOR NO SLIPPING,

$$\Sigma F_x = ma_x: P - F = ma_x, \quad F = P - ma_x = P - \left(\frac{W}{g}\right) r_2 \alpha$$

$$\Sigma M_C = \Sigma (M_C)_{\text{EFF}} + \dot{S}: -(r_1 + r_2)P = -r_2 \cdot ma_x - I\alpha$$

$$(r_1 + r_2)P = r_2 \left(\frac{W}{g}\right) \cdot r_2 \alpha + \left(\frac{W}{g}\right) k^2 \alpha$$

$$\alpha = \frac{(r_1 + r_2) g P}{W (r_2^2 + k^2)} = \frac{\left[\frac{1}{3} + \frac{2}{3} \text{ ft}\right] \left(32.2 \frac{\text{ft}}{\text{s}^2}\right) (5 \text{ LB})}{(10 \text{ LB}) \left[\left(\frac{2}{3} \text{ ft}\right)^2 + \left(\frac{1}{2} \text{ ft}\right)^2\right]} = 23.18 \frac{\text{RAD}}{\text{s}^2}$$

$$F = (5 \text{ LB}) - \frac{(10 \text{ LB})}{\left(32.2 \frac{\text{ft}}{\text{s}^2}\right)} \cdot \left(\frac{2}{3} \text{ ft}\right) \left(23.18 \frac{\text{RAD}}{\text{s}^2}\right) = 0.2 \text{ LB}$$

FOR NO SLIPPING, THE MAXIMUM FRICTION IS

$$F_{\text{max}} = \mu_s N = \mu_s W = (0.25)(10 \text{ LB}) = 2.5 \text{ LB} \quad \left[F < F_{\text{max}} \Rightarrow \text{NO SLIPPING} \right]$$

$$a_x = r_2 \alpha = \left(\frac{2}{3} \text{ ft}\right) \left(23.18 \frac{\text{RAD}}{\text{s}^2}\right) = 15.45 \frac{\text{ft}}{\text{s}^2} \rightarrow$$