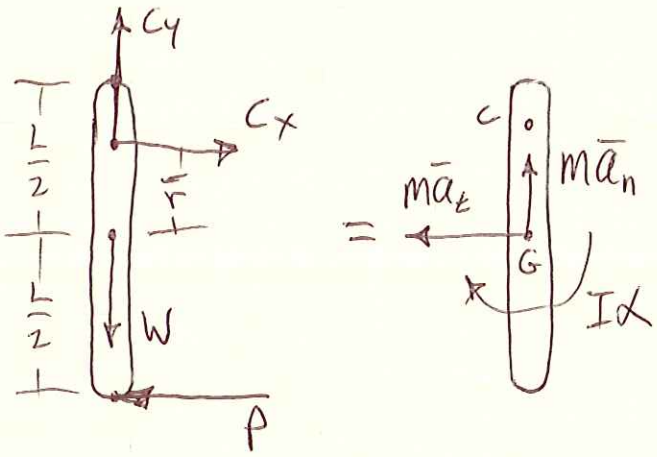
PROB. 16-78

$L = 0.9^m$, $m = 4^{kg}$, $P = 75^N$, $\bar{r} = 0.225^m$,

FIND α, C_x, C_y



$\Sigma F_x = ma_x$:

$C_x - P = -m\bar{a}_t$

$\boxed{C_x = P - m\bar{r}\alpha}$

$\Sigma F_y = ma_y$: $C_y - W = m\bar{a}_n$, $a_n = r\omega^2 = 0$ SINCE $\omega = 0$

$C_y = W = mg = (4^{kg})(9.81\ \frac{m}{s^2}) = \boxed{39.24^N \uparrow}$

$\Sigma M_C = \Sigma(M_C)_{EFF}$ $+\circlearrowleft$: $-(\frac{L}{2} + \bar{r})P = -\bar{r}m\bar{a}_t - I\alpha$

$(\frac{L}{2} + \bar{r})P = \bar{r}m \cdot \bar{r}\alpha + \frac{1}{12}mL^2 \cdot \alpha$

$\alpha[m(\bar{r}^2 + \frac{L^2}{12})] = (\frac{L}{2} + \bar{r})P$

$$\alpha = \frac{(\frac{L}{2} + \bar{r})P}{m(\bar{r}^2 + \frac{L^2}{12})} = \frac{[(\frac{0.9^m}{2}) + (0.225^m)](75^N)}{(4^{kg})[(0.225^m)^2 + \frac{(0.9^m)^2}{2}]}$$

$\boxed{\alpha = 107.1\ \frac{RAD}{s^2}\ \curvearrowleft}$

$C_x = (75^N) - (4^{kg})(0.225^m)(107.1\ \frac{RAD}{s^2}) = \boxed{-21.43^N \leftarrow}$