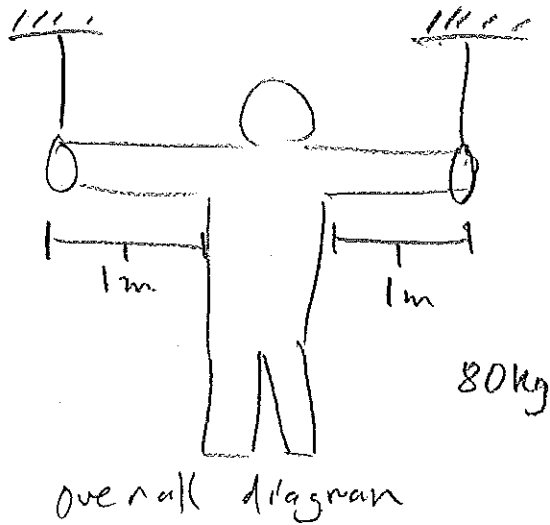
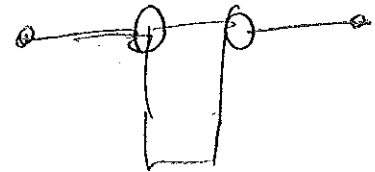


Solve problem

iron cross

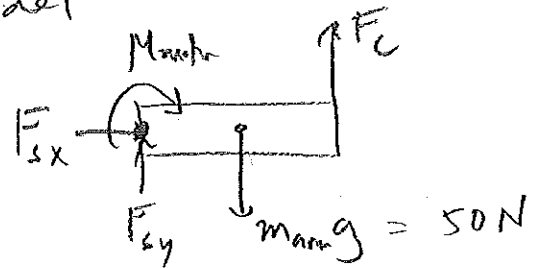
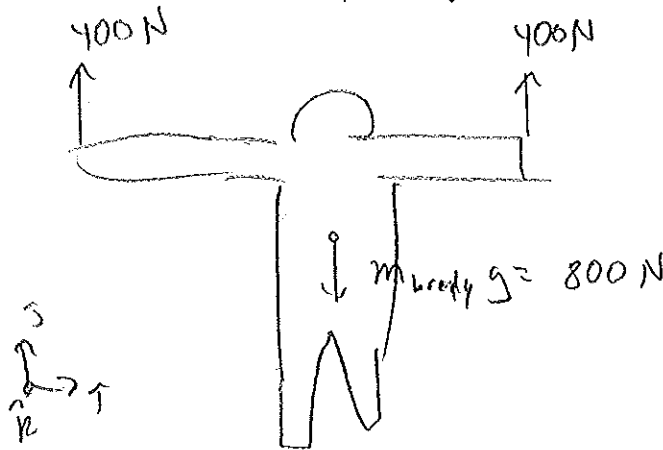


want to solve for required motor torque to take youtube video



google average weight of adult male 80kg
 come up with easy dimensions to work with
 1m long arms

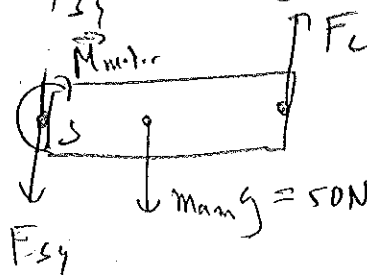
assume symmetry + planar model



arm mass 5kg
 $g \approx 10 \text{ m/s}^2$
 assume static eq
 $\Sigma \vec{F} = \vec{F}_{sx} + \vec{F}_{sy} + M_{arm}g \hat{j} + \vec{F}_c = 0$

$$\begin{aligned} \Sigma F_x &= 0 \\ &= F_{sx} \\ &= |F_{sx}| \uparrow = 0 \end{aligned}$$

$$\begin{aligned} \Sigma F_y &= 0 \\ &= 400 \hat{j} - 50 \hat{j} + F_{sy} \\ \vec{F}_{sy} &= -350 \hat{j} \end{aligned}$$

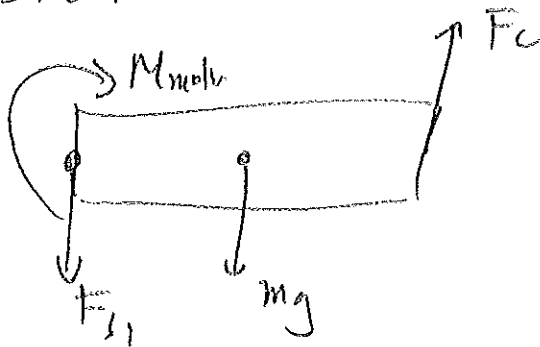


$$\begin{aligned} \vec{F}_c &= 400 \hat{j} \\ \vec{F}_m &= 50 - \hat{j} \\ \vec{F}_{sy} &= ? \\ \vec{F}_{sx} &= |F_{sx}| \uparrow = 0 \end{aligned}$$

$$\begin{aligned}
 \sum \vec{M}_{/s} &= 0 \\
 &= \vec{M}_{F_{31}} + \vec{M}_{m \cdot h_r} + \vec{M}_{m_{mass}} + \vec{M}_{F_c} \\
 &= 0 + \vec{M}_{m \cdot h_r} + 50 \frac{L}{2} (-\hat{k}) + 400 L \hat{k}
 \end{aligned}$$

$$\begin{aligned}
 \vec{M}_{m \cdot h_r} &= -50 \frac{L}{2} (-\hat{k}) - 400 (L) \hat{k} \\
 &= 25 L \hat{k} - 400 L \hat{k}
 \end{aligned}$$

$$\vec{M}_{m \cdot h_r} = -375 L \hat{k}$$



interpretation?