Homework H5
Online portfolio upload.

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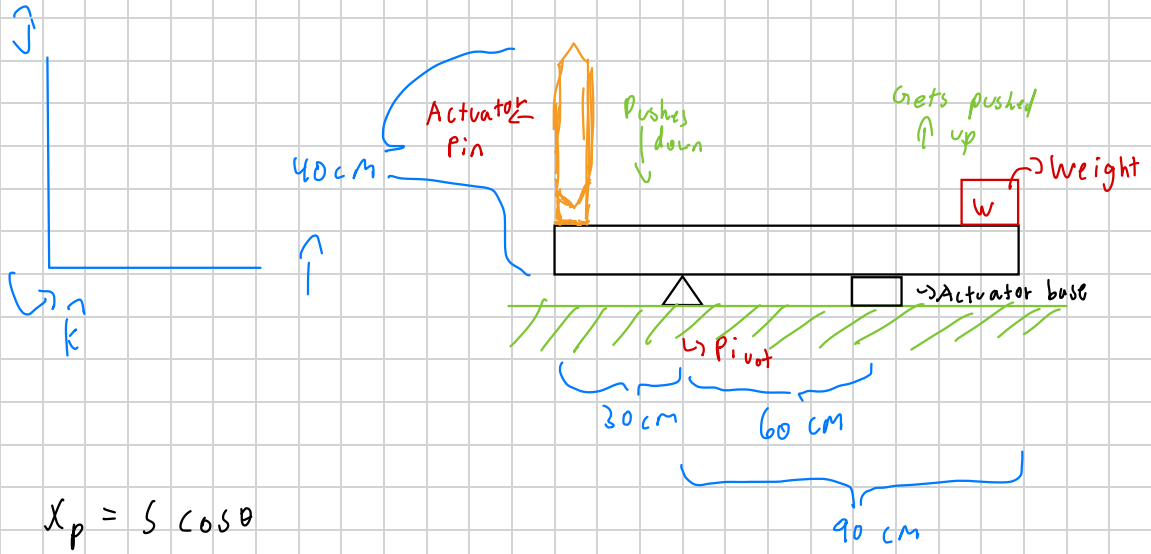

Dimensions: L = 1.50 m
S → distance to pivot → 0.3 m
x_b = Actuator location .6 m from pivot.

$$x_p = S\cos\theta$$

$$y_p = S\sin\theta$$

$$l(\theta) = \sqrt{(x_b - S\cos\theta)^2 + (S\sin\theta)^2} = .38\ m$$

$$M(\theta) = F \cdot \frac{S x_b \sin\theta}{l(\theta)}$$

$$y_{tip}(\theta) = L\sin\theta$$

$$w_{max}(\theta) = \frac{M(\theta)}{L} = \frac{F S x_b \sin\theta}{L\, l(\theta)} \rightarrow 2000\,\frac{(.3)(.6)(.3)}{(.3325)} = 360.95\ N$$

$$\theta_{max} = \arcsin\left(\frac{.5}{L}\right)$$

$$w_{max} = \frac{M}{L} = \frac{360.95}{1.5} = 240.57\ N$$

$$m = \frac{W}{g} = \frac{240.57}{9.8} = 24.5\ kg$$

$$p = \frac{F}{A} = \frac{F}{\pi r^2} \rightarrow 25\pi \rightarrow \frac{2000}{(.05)^2\pi} = 25.46\ MPa$$

Assume pin radius = .05 m