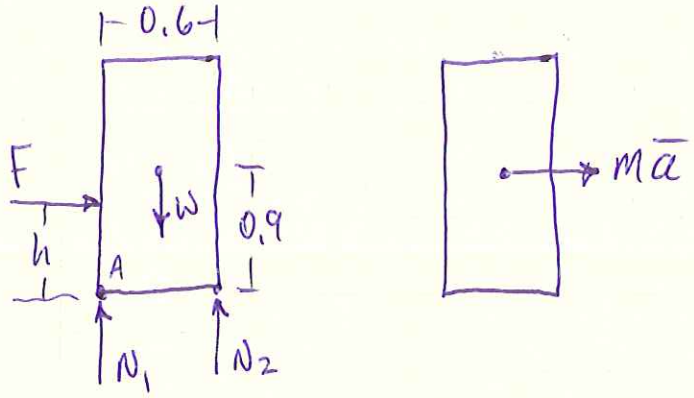
PROB. 16-7

$m = 20^{kg}$, $\mu = 0$, $F = 100^{N}$. FIND a AND THE RANGE OF h FOR NO TIPPING.



$$W = mg = (20^{kg})\left(9.81\ \tfrac{m}{s^2}\right) = 196.2^{N}$$

$$\Sigma F_x = m\bar{a}_x: \quad F = ma$$

$$a = \frac{F}{m} = \frac{(100^{N})}{(20^{kg})} = 5\ \tfrac{m}{s}\ \rightarrow$$

CABINET TENDS TO TIP CW $\circlearrowright$: $N_1 = 0$

$$\Sigma \vec{F}_y = m\bar{a}_y: \quad N_2 - W = 0 \Rightarrow N_2 = 196.2^{N}$$

$$\Sigma \vec{M}_A = \Sigma(\vec{M}_A)_{EFF} \quad +\circlearrowleft:$$

$$-hF - 0.3W + 0.6N_2 = -0.9ma$$

$$h = \frac{1}{F}(0.9ma - 0.3W + 0.6N_2)$$

$$h = \frac{1}{(100^{N})} \cdot \left[0.9(20^{kg})(5\ \tfrac{m}{s^2}) - 0.3(196.2^{N}) + 0.6(196.2^{N})\right]$$

$$h = 1.489^{m}$$

PROB. 16-7 CONT.

CABINET TENDS TO TIP CCW ↺: $N_2 = 0$

$\Sigma \vec{F}_y = m\vec{a}_y$: $N_1 - W = 0 \Rightarrow N_1 = 196.2^N$

$\Sigma \vec{M}_A = \Sigma (\vec{M}_A)_{EFF}$ ↺:

$-hF - 0.3W = -0.9ma$

$h = \frac{1}{F}(0.9ma - 0.3W)$

$h = \frac{1}{(100^N)}\left[0.9(20^{kg})\left(5\,\frac{m}{s^2}\right) - 0.3(196.2^N)\right]$

$\boxed{h = 0.3114^m}$

RANGE OF h FOR NO TIPPING:

$\boxed{0.3114 \leq h \leq 1.489^m}$