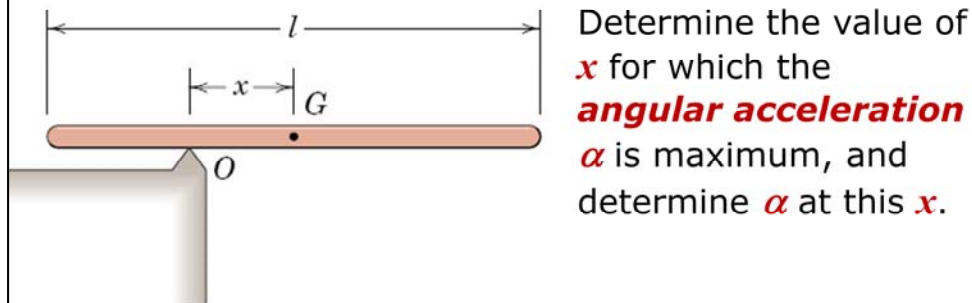


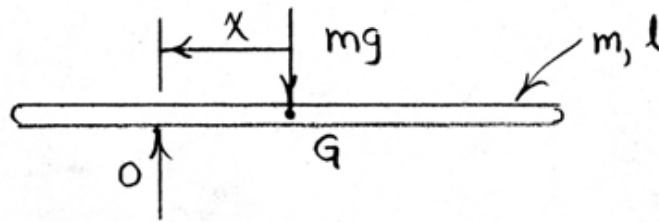
Question of the Day

The uniform slender bar is released from rest in the horizontal position shown.



ME 231: Dynamics

6/47



$$I_0 = I_G + mx^2 = \frac{1}{12}ml^2 + mx^2 = m \left(\frac{l^2}{12} + x^2 \right)$$

$$2 \sum M_0 = I_0 \alpha : mgx = m \left(\frac{l^2}{12} + x^2 \right) \alpha$$

$$\alpha = \frac{gx}{\frac{1}{12}l^2 + x^2}$$

$$\frac{d\alpha}{dx} = \frac{\left(\frac{1}{12}l^2 + x^2 \right)g - gx(2x)}{\left(\frac{1}{12}l^2 + x^2 \right)^2} = 0 \Rightarrow \underline{x = \frac{l}{2\sqrt{3}}}$$

$$\alpha = \frac{g \frac{l}{2\sqrt{3}}}{\frac{1}{12}l^2 + \frac{1}{12}l^2} = \underline{\underline{\sqrt{3} \frac{g}{l}}}$$