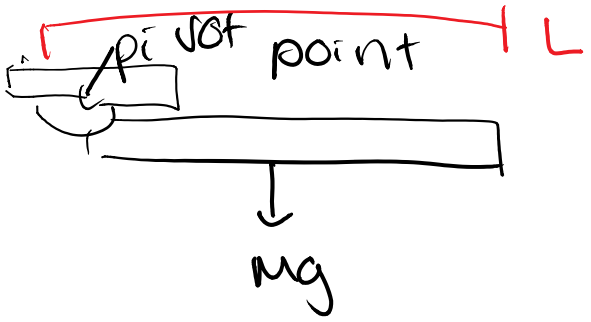
Rotating Rod

Wednesday, April 2, 2014 9:29 AM

A uniform rod of length L and mass M is attached at one end to a frictionless pivot and is free to rotate about the pivot in the vertical plane. The rod is released from rest in the horizontal position. What are the initial angular acceleration of the rod and the initial translational acceleration of the right end?



Note: rigid object under torque

we cant say constant angular acc bc torque varies w/ position

$$\Sigma\tau = FR = Mg\,L/2$$

$$\tau = I\alpha$$

$$\alpha = \tau/I = \frac{Mg\,L/2}{I} = \frac{Mg\,L/2}{\frac{1}{3}ML^2} = \frac{3g}{2L}$$

$$a = L\alpha = L\,\frac{3g}{2L} = \frac{3g}{2}$$