2. (25 points) Shown below is a 1 m long, 10 kg rotating slender bar, initially in the vertical position (with $\omega_1 = 2$ rad/sec). Attached to it is a massless spring ($k = 100$ N/m, unstretched length = 0.4 m). Please determine $\omega_2$ when the bar is horizontal.
$\omega_1 = 2 \text{ r/s}$

Spring: $k = 100 \text{ N/m}$

Unstretched: $L_0 = 0.4 \text{ m}$

1 m, 10 kg Slender Rod