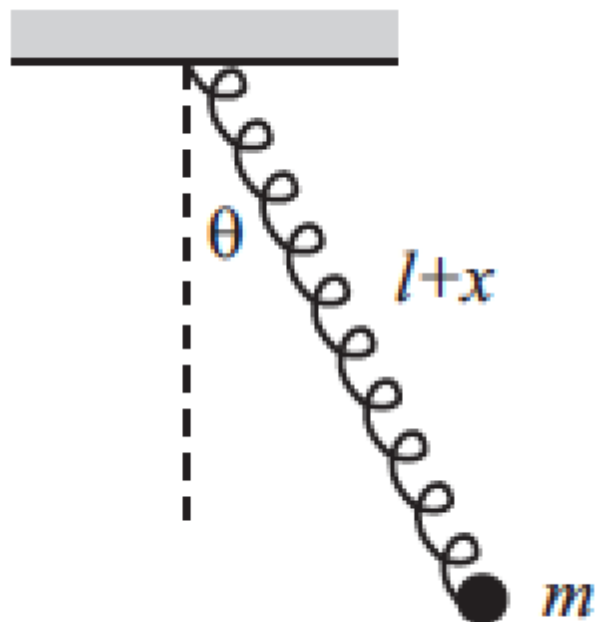


## Problem 5.3



$$m\ddot{x} = m(\ell + x)\dot{\theta}^2 + mg \cos \theta - kx,$$

$$m(\ell + x)\ddot{\theta} + 2m\dot{x}\dot{\theta} = -mg \sin \theta.$$