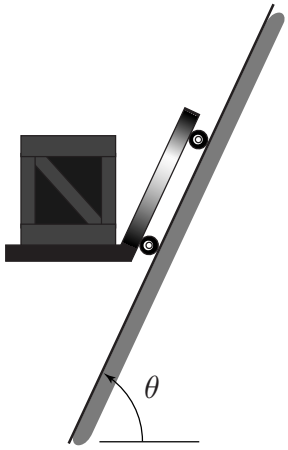
Name _____ Section _____

Problem Set 3
Due February 4, 1999

Professors Gray & Costanzo Spring 1999

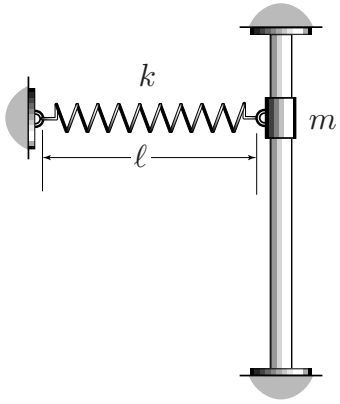
Problem 1

If the coefficient of static friction between the crate and the platform is μ_s, determine the maximum acceleration that the elevator platform can have down the incline so that the crate does not slip.



Problem 2

The spring-mass system shown is released from rest, and the mass m slides vertically on a smooth rod. If the spring has constant k and is unstretched at the position shown, write the differential equation of motion for the mass. Subsequently, let $m = 2$ kg, $l = 0.3$ m and $k = 300$ N/m, and use Mathematica to numerically solve the equation of motion. Finally, plot the resulting motion versus time.



Problem 3

Block B has mass m and is released from rest when it is on top of cart A, which has a mass of $3m$. Determine the tension in the cord CD needed to hold the cart from moving while B is sliding down A. Solve the problem for two cases: (i) when the coefficient of kinetic friction between the cart and the crate is μ_k; (ii) when the contact between the cart and the crate is smooth.