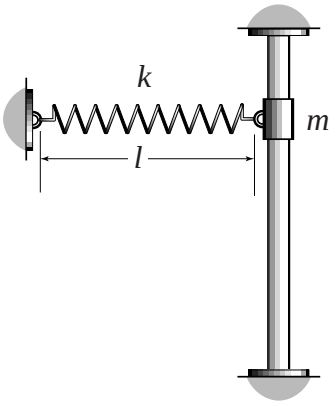
Name _____ Team _____ Section ____

Problem Set 5
Due February 18, 1999

Professors Gray & Costanzo Spring 1999

Problem 1



The spring-mass system shown is released from rest in the position shown and the mass m slides vertically on the rod.

(a) If the spring has constant k and is unstretched in the position shown, determine the equation for the distance through which the mass falls before first coming to a stop. Assume that μ_k is the coefficient of kinetic friction between the mass and the rod.

(b) After obtaining the equation in part (a), let $m = 2$ kg, $l = 0.3$ m, $k = 300$ N/m, and $\mu_k = 0.2$ and use Mathematica to numerically find this distance. Finally, determine the minimum value of the coefficient of static friction μ_s so that the mass will not start to move back up after coming to a stop.

Problem 2

The spring with constant $k = 20$ lb/ft is connected to the floor and to the 200 lb collar A. Collar A is at rest, supported by the spring, when the 300 lb box B is released from rest in the position shown. What are the velocities of the collar and box when the box B has fallen 2 ft?