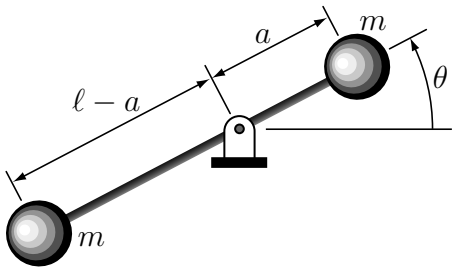
Name _____ Team _____ Section ____

Problem Set 7
Due March 4, 1999

Professors Gray & Costanzo Spring 1999

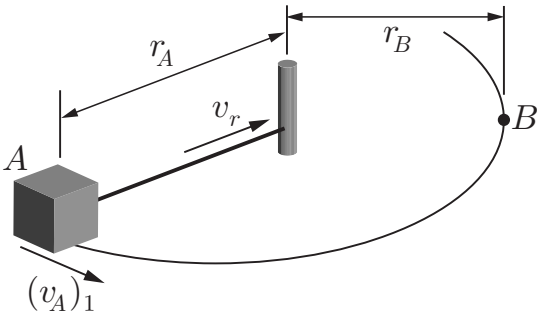
Problem 1

Two indentical masses are connected by a rigid bar of negligible mass, rotate in a vertical plane, and are pinned as shown. In addition, there is damping moment of the form $-c\omega$ N·m generated at the pin, where ω is the angular velocity of the bar. If the system is released from rest in a horizontal position, determine the angular equation of motion, along with all appropriate initial conditions, using angular momentum techniques.



Problem 2

A box having a weight of 8 lb is moving around a circle of radius $r_A = 2$ ft with a speed of $(v_A)_1 = 5$ ft/s while connected to the end of a rope. If the rope is pulled inward with a constant speed of $v_r = 4$ ft/s, determine the speed of the box at the instant $r_B = 1$ ft. How much work is done by pulling in the rope from A to B? Neglect friction and the size of the box.



Problem 3

A car C having a mass of 1000 kg is tied to a van V having a mass of 1750 kg so that it can tow it to the junk yard. If the cable connecting the two is elastic with a stiffness of 75 kN/m, determine the maximum stretch in the cable during the initial part of the tow. Originally, both the car and the van are coasting in the same direction with speeds $(v_C)_1 = 15$ km/h and $(v_V)_1 = 10$ km/h, respectively. Neglect friction and rolling resistance and assume that neither car brakes or accelerates for the duration of the motion.