University of Alabama
Department of Physics and Astronomy

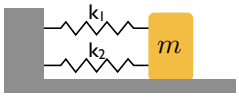
PH 105 LeClair Summer 2012

Problem Set 6

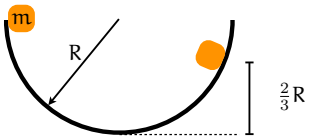
Instructions:

1. Answer all questions below. All questions have equal weight.
2. Due Fri 8 June 2012 at the start of lecture, or electronically by 11:59pm.
3. You may collaborate, but everyone must turn in their own work.

1. A mass m is connected to two springs k_1 and k_2 as shown below. If the mass is pushed to the left such that the springs both compress by a distance x from equilibrium and released from rest, what is the velocity of the object as it passes through its original equilibrium position?



2. A particle of mass m is released from rest at the rim of a smooth bowl of radius R as shown below. It slides without friction down the bowl, and up the other side. When the particle is at a height $\frac{2}{3}R$ from the base of the bowl, what is its speed? Assume the particle is a point mass, and has no moment of inertia.



3. A *point mass* m moves along the frictionless track shown below. It starts from rest at a height h above the bottom of the loop of radius R, where R is much larger than r. What is the minimum value of h (in terms of R) such that the object completes the loop? *Hint: work-energy will get you the velocity at the top of the loop, but centripetal force tells you if you can stay on the loop.*