Physics 820 homework XII, due Mon Nov 17

Reading: Chapters 6, 8.1

Problems:

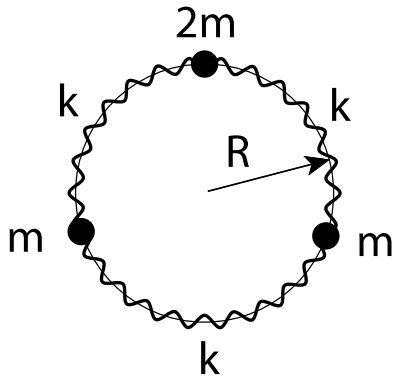
1. Goldstein, Problem 6-4.

2. Goldstein, Problem 6-12.

3. For the system in problem 6-12 in Goldstein, determine the particle positions as a function of time, if, at $t = 0$, (a) the displacements and the velocity of the second particle are zero while the first particle moves at a velocity v, (b) the velocities and the displacement of the second particle are zero while the first particle is displaced by $+d$. (c) Find the general solution of the equations of motion if the particles get subjected to friction forces proportional to velocities, with a proportionality coefficient ν.

4. Goldstein, Problem 6-18.

5. From the August '03 subject exam:
Three beads are mounted on a ring and connected by three identical springs, as shown.



Two beads are of mass m and one of mass $2m$. The ring radius is R. The spring constant is k and the spring mass may be neglected. The masses and springs are free to move around the ring. (a) Find a Lagrangian for the system of beads and springs, in terms of suitably chosen coordinates. (b) Find frequencies of normal vibrations for the system. (c) Find normal coordinates for the system. (Can you find any shortcuts, bypassing standard procedures, relying on physical or symmetry considerations?)