PHY 5246: Theoretical Dynamics, Fall 2011

November 4^{th}, 2011

Assignment # 8

(Graded problems are due Friday November 18^{th}, 2011)

1 Graded problems

1. Determine the eigenfrequencies and describe the normal mode motion for two pendula of equal lengths b and equal masses m connected by a spring of force constant κ. The spring is unstreched in the equilibrium position.

2. An idealized *linear classical water molecule* consists of three particles in a line connected by equal springs and constrained to move along the line joining them. The outer two particles have mass μ, the central one has mass ν, and the spring constant is k.

(2.a) Find the normal modes (describe them) and the normal frequencies.

(2.b) Write down the general solution.

(2.c) Write down the solution with initial conditions $x_1(0) = -A$, $x_2(0) = A\mu/\nu$, $x_3(0) = 0$, and $\dot{x}_i = 0$ for $i = 1, 2, 3$.

3. Chapter 6, Problem 4 of your Textbook (do the case of equal masses first).

2 Non-graded suggested problems

4. Chapter 6, Problem 1 of your Textbook.

5. Chapter 6, Problem 5 of your Textbook.