Phys 410

Fall 2013

Homework #10

Due Thursday, 5 December, 2013

All problems are from Taylor, *Classical Mechanics*.

1) Problem 11.2 Coupled vertical masses on springs
2) Problem 11.3 Two masses and three springs – general result
3) Problem 11.5   Two masses and two springs – normal modes
4) Problem 11.7   Time evolution of coupled oscillators
5) Problem 11.9   Normal coordinates for coupled oscillators
6) Problem 11.12 Coupling through molasses!
7) Problem 11.14 Pendula coupled by a spring
8) Problem 11.19 Normal modes of cart + pendulum [*Hint: For small oscillations, take the velocity of the bob and the cart to both be in the x-direction only. Later, construct a matrix version of the equations of motion using a position vector of the form* $\begin{pmatrix} x \\ \varphi \end{pmatrix}$.]
9) Problem 11.31 Three beads on a loop coupled with springs
10) Problem 12.1   A nonlinear differential equation

Extra Credit

1) Problem 11.32   Vibrational modes of a linear tri-atomic molecule