

Phys 410

Spring 2013

Homework #10

Due Friday, 26 April, 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