

PHYS 620 Classical Mechanics: Assignment 11

Due 12/06/24

1. Taylor: Problem 10.46.
2. Taylor: Problem 10.48.
3. Taylor: Problem 10.49.
4. Taylor: Problem 10.53.
5. Taylor: Problem 10.55.
6. Taylor: Problem 11.2.
7. Taylor: Problem 11.4.
8. Two blocks of masses $m_1 = 2m$ and $m_2 = m$ move on a horizontal frictionless surface. The first block is connected by an ideal weightless spring of spring constant $k_1 = 2k$ to a rigid vertical wall. The second block is connected to the first one by the same type of spring with a spring constant $k_2 = k$. The two blocks and the springs are aligned along a line perpendicular to the wall at all times. Measure the positions x_1 and x_2 of the blocks relative to their equilibrium positions.
 - (a) Find the normal mode frequencies ω_i of the system. *Hint:* Use complex exponential functions.
 - (b) Find the normal modes of vibrations (i.e., eigenvectors) and briefly describe the motions verbally.
 - (c) Find $x_i(t)$ for the system with initial conditions $x_1(0) = x_2(0) = \dot{x}_1(0) = 0$ and $\dot{x}_2(0) = v_0$. *Hint:* A linear combination of normal modes is a solution of Newton's equations. Remember to take into account the complex conjugate exponentials.

