PHYS 331 — Problem Set #4

Reading:

- Taylor 4.8 (Note: Eq. (4.69) is dangerous — it only works if **a** and **b** are defined at a common point)
- Taylor 5.1–5.2, 5.4–5.6 (some of these suggested before)

Problems:

1. Taylor 4.35
2. Taylor 4.43
3. Taylor 4.44
4. In Example 5.3 starting on p. 185, Taylor determines the motion of a specific driven, damped, oscillator, using analytical expressions for the constants of Eq. (5.69). Throw Eq. (5.69) out the window, along with analytical formulas, and numerically integrate the equation of motion for the oscillator described in the problem. This should entail a very small modification of the program you used for Problems 1.50/1.51. Your results should match those illustrated in Figure 5.15.
    - You should change any comments in your code so that they are appropriate for this problem. (Your comments do not have to formatted with LaTeX, but I encourage you to do so if you know how).
    - You should not be importing any additional modules beyond those used in class.
5. (a) Consider a particle with mass m confined to move in one dimension with potential energy given by
$$U(x) = c(e^x + e^{-x}).$$
Plot the function and determine the frequency of small oscillations of the particle.

   (b) Repeat for the potential energy
$$U(x) = c(e^x + 4e^{-x}).$$