

PHYS 2022 - Homework 3  
Due Wednesday, February 10, 2009.

Reading:

French: Chapter 2, pp. 62-70.  
Y&F: 13.7 (damped oscillations).

Problems:

1. French 2-3. Show your calculations. You may use plotting software but be sure to mark the characteristic scales on both axes.
2. French 2-5. You may use plotting software if you like.
3. A beat sound is produced by simultaneous oscillations of two tuning forks.
  - a. The beat period (time between two successive minima in sound intensity) is 1 second. The oscillation frequency of one tuning fork is 256 Hz. Find the frequency of the second fork.
  - b. On oscilloscope screen, the maximum amplitude of the resulting slow oscillation is A. The minimum amplitude is B. (The two tuning forks vibrate with different amplitudes.) Find the amplitudes of the tuning fork vibrations in terms of A and B.
4. French 3-14.
5. A pendulum is oscillating so that its amplitude decays from 27.18 cm to 10 cm in 25 cycles.
  - a. Find the quality Q of the system.
  - b. If the natural frequency of this pendulum is  $\omega_0$  and the initial amplitude is  $A_0=27.18$  cm, write an equation that describes how the amplitude of the oscillations decays with time.
  - c. If the period of oscillations is 4 seconds, what is the time in which the amplitude decays from 10 cm to 3.68 cm? Just by looking at the ratio of these two amplitudes, can you say how many cycles it would take?