PHYSICS 109 HOMEWORK 2

Name: __________________________  Discussion Number: _____________

• Due Monday, September 22

1) What is the phase difference between the two oscillation shown?_______________
   What is the phase difference between 3 and 3.5 ms (on the dashed graph)?_______________

   ![Graph of oscillations]

2) A guitar string has a frequency of 250 Hz (middle C) and a damping time $\tau = 2$ s.
   How many oscillations does the string make before the amplitude has decreased half its original value?
   $N=___________$

3) A $M=2$ kg mass is oscillating with a period $T=0.5$ s. What would the frequency of oscillation be if the mass is replaced with a mass that is: a) $M_1=0.5$ kg, b) $M_2=4$ kg?
   a) $f_1=___________$  b) $f_2=___________$

4) A spring has a spring constant $k=30$ N/m, and an unstretched length $L=0.5$ m.
   What will the length $L_1$ of the string be if one applies a force $F=3$ N?
   $L_1=___________$

5) The resonance curve of the tuning fork resonator box that we measured in class is shown to the right.
   What is the FWHM for this resonator?
   What do you expect the damping time $\tau$ of the cavity to be?
   FWHM=_____________  $\tau=_____________

   ![Graph of resonance frequency]

6) (For honor credit) Source A makes 10 oscillations per second ($f_A = 10$ Hz), Source B makes oscillations per second ($f_B = 11$ Hz). The two sources start in phase at time $t=0$.
   How long will it be before the two oscillations are $180^\circ$ out of phase?
   $t=___________$