UNIVERSITY OF CALIFORNIA, SANTA BARBARA

Department of Physics

Physics 105A   Winter 2012

Prof. Gary Horowitz   TA William Kelly

ASSIGNMENT #6

Due by Friday, February 24 at 5pm in box on first floor of Broida

1) An *undamped* oscillator is driven at its resonance frequency ω_0 by a harmonic force $F = F_0 \cos \omega_0 t$. Initially, the oscillator is at rest at the origin.

   (a) Find the general solution $x(t)$ to the equation of motion (ignoring the initial conditions). Hint: To find a particular solution of the inhomogeneous equation, try a solution of the form $x(t) = Bt^p \sin \omega_0 t$.

   (b) Impose the initial condition and find the specific solution appropriate for this problem.

   (c) Suppose the spring breaks if the force exceeds $5F_0$. Derive an equation for the time t_b to reach the breaking point. (This equation can only be solved numerically, so you don't need to calculate t_b explicitly.)

2) Taylor, problem 5.43

3) Taylor, problem 5.47

4) Taylor, problem 6.1

5) Taylor, problem 6.5