PHYS2202 Nonlinear Optics

Problem Set 1

Due at the beginning of class on Tuesday, March 10, 2020

1. (20 points) **Third order anharmonic response**
   Consider a classical electron centered on an immobile ion and bound about the position $x = 0$ by an anharmonic potential

$$U(x) = \frac{1}{2} m\omega_0^2 x^2 + \frac{1}{3} v_a x^3 + \frac{1}{4} v_b x^4.$$

   What is the response at frequency $2\omega_2 - \omega_1$ to a driving electric field

$$E(x = 0, t) = E_1 \cos(\omega_1 t) + E_2 \cos(\omega_2 t) + E_3 \cos(\omega_3 t),$$

   where $\omega_3 > \omega_2 > \omega_1$.