Physics 321 – Spring 2017

Homework #4, Due at beginning of class Wednesday Feb 8.

1. [5 pts] A uniform flat sheet of metal occupies the region $0 < y < (A^2 - x^2)/B$ in the plane $z = 0$, where A and B are positive constants and $-A < x < A$.

   (a) Find the position of its center of mass.

   (b) Find its moment of inertia for rotations around the z axis about the point $x = y = 0$. (Give your answer in terms of the total mass M, and the parameters A and B.)

   (c) Find its moment of inertia for rotations about an axis that points in the z direction through its center of mass. Again give your answer in terms of the total mass M and the parameters A and B. (Hint: remember the parallel axis theorem.)

2. [5 pts] A point particle with charge Q and mass M is subjected to a time-dependent electric field which points in the $\hat{x}$ direction, with

$$E_x = E_0 \sin(Bt)$$

   where E_0 and B are constants. Assume the particle starts at x_0 and has velocity v_0 in the positive $\hat{x}$ direction at time $t = 0$. The motion is in one dimension since $y = z = 0$ at all times. Find $x(t)$.

3. [5 pts] Taylor problem 3.11 parts (a) and (b) only.

4. [5 pts] Taylor problem 3.29

(Last updated 2/1/2017.)