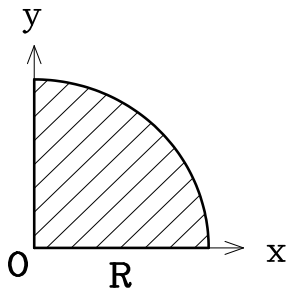
Physics 321 – Spring 2017

Homework #5, due at beginning of class Friday Feb 17.

1. [10 pts] Suppose that the friction force on an object of mass M traveling through a fluid is proportional to the cube of the velocity: $F = -K\,v^3$, where K is a constant. Find the velocity as a function of time, assuming that the initial velocity is v_0 at time $t=0$. Neglect gravity.

2. [10 pts] A sheet of metal is cut in the shape of a quarter of a disk with radius R. The two straight sides are along the x and y axes, which intersect at point O. The mass distribution is not uniform: the mass per unit area is given by $\sigma = c\,x$ where c is a constant.



   (a) Find the mass of this object.

   (b) Find its moment of inertia for rotations in the x-y plane about the point O.

   (c) Find the position $(x_{\rm cm}, y_{\rm cm})$ of its center of mass.

(Last updated 2/13/2017.)