110A, HW12: Due Thursday 12/8 in class.

1. A hollow sphere of radius R is given a uniform surface charge density $\sigma$. It is centered on the origin. Then it is rotated around the z axis at a constant angular velocity of $\omega$.
A) Find the total magnetic dipole moment. (Hint: think of the sphere as a bunch of small ribbons of current. Careful: The area of each ribbon is easiest to find in Cartesian coordinates, but the current of each ribbon is easiest to find in spherical coordinates. Choose one!)
B) Find an **approximate** expression for the magnetic field at large distances from the sphere, in spherical coordinates.

2) Problem 6.16 (the coaxial cable, with the return current.) Don't forget to check that your bound currents generate the correct B-field!

3) Problem 6.7. (The magnetized cylinder.) Hint: First find the bound currents!

4) Consider the last midterm problem: A long cylinder of radius R is given a uniform charge density $\rho$ and spun on its axis at a constant angular velocity of $\omega$. If the cylinder is made out of a paramagnetic material with $\chi_m$=+0.2, find the magnetic field at a radius "s" inside the spinning cylinder.