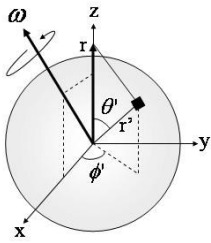Problem 1

Use the results to find the field inside a uniformly charged sphere, of total charge Q and radius R, which is rotating at a constant angular velocity ω.

$$A(r,\theta,\phi) = \frac{\mu_0 R \omega \sigma}{3} r \sin\theta \hat{\phi} \qquad r \leq R$$

$$A(r,\theta,\phi) = \frac{\mu_0 R^4 \omega \sigma}{3} \frac{\sin\theta}{r^2} \hat{\phi} \qquad r \geq R$$

Problem 2

A circular loop of wire, with radius R, lies in the *xy* plane, centered at the origin, and carries a current *I* running counterclockwise as viewed from the positive z axis.

(a) What is its magnetic dipole moment?

(b) What is the (approximate) magnetic field at points far from the origin?

(c) Show that, for points on the z axis, your answer is consistent with the exact field, when $z \gg R$.