Physics 611 **Homework #2** **handed out 15 September 2016**
due 22 September 2016

1. For an electric monopole (point electric charge) with charge e and a magnetic monopole of charge g separated from it by distance R, find the angular momentum stored in the fields. Requirement: use a method noticeably different from the one shown in Jackson.

2. For a plane wave moving in the $\hat{z}$ direction, the electric field may be written as

$$\vec{E}(\vec{x}, t) = \mathrm{Re}\left[(E_1\hat{x} + E_2\hat{y})\, e^{i(\vec{k}\cdot\vec{x} - \omega t)}\right] .$$

a) For $z = 0$, find the x and y components of the electric field for the case E_1 and E_2 are 90° out of phase and E_2 has one third the magnitude of E_1. Sketch the evolution of $\vec{E}$ with time over one cycle.

b) Again for $z = 0$, find the x and y components of the electric field for the case E_1 and E_2 are 45° out of phase and E_2 has the same magnitude as E_1. Again, sketch the evolution of $\vec{E}$ with time over one cycle.

(You may make the sketches by hand, or using Mathematica or equivalent.)

3. Jackson problem 7.27.