**Electric Dipole Radiation - point dipole**

1. Show that for a point dipole, where "$\sim$" means to approach asymptotically in the radiation zone,

   (a)
   $$\vec{E}_{rad} \sim \frac{\mu_o}{4\pi r}\left[\hat{r}\left(\hat{r}\cdot\frac{d^2\vec{p}}{dt^2}\right) - \frac{d^2\vec{p}}{dt^2}\right]$$

   (b)
   $$\vec{S}_{rad} \sim \frac{\mu_o}{c}\left(\frac{1}{4\pi r}\right)^2\left[\left|\frac{d^2\vec{p}}{dt^2}\right|^2 - \left(\hat{r}\cdot\frac{d^2\vec{p}}{dt^2}\right)^2\right]$$

2. For a Hertzian point dipole where $\vec{p} = p_o\cos(\omega t)\hat{z}$, show that

   $$\vec{B}_{rad} \sim -\frac{\mu_o p_o \omega^2}{4\pi c}\frac{\cos\left[\omega(t - r/c)\right]}{r}\sin(\theta)\hat{\phi}$$
   $$\vec{E}_{rad} \sim -\frac{\mu_o p_o \omega^2}{4\pi}\frac{\cos\left[\omega(t - r/c)\right]}{r}\sin(\theta)\hat{\theta}$$
   $$\vec{S}_{rad} \sim \frac{\mu_o p_o^2 \omega^4}{16\pi^2 c}\frac{\cos^2\left[\omega(t - r/c)\right]}{r^2}\sin^2(\theta)\hat{r}$$

   Note that these are identical to the results that Griffiths obtains, using a different method.