Due Apr. 9, Thursday

Problem 1 (10 points) Problem 8.13 (energy, Poynting vector).

Problem 2 (10 points) Problem 8.16 (electromagnetic momentum).

Problem 3 (10 points) Problem 8.17 (a wishful classical model of electron).

Problem 4 (10 points) Problem 8.7 (Maxwell stress tensor).

Problem 5 (10 points) Problem 8.23 ($\vec{S}$, u, etc., in terms of $\vec{D}$, $\vec{H}$, etc.).

Problem 6 (10 points) Two circular plates of radius a separated by distance d form an ideal capacitor. The linear dielectric medium that fills the space between the two plates is a perfect insulator with uniform $\vec{D}$ field (ignore the fringing field at the edges). The capacitor is being charged by a constant current I. Find the $\vec{H}$ field and the Poynting vector, $\vec{S}$, between the two plates, and show that the total surface integral of $\vec{S}\cdot\vec{n}$ ($\vec{n}$ is the surface normal vector of unit length) of a properly defined surface accounts for the time rate of change of the stored electrostatic energy. [Use the results of the previous problem for the definition of $\vec{S}$ and, if necessary, u.]

Problem 7 (10 points; extra credit) Problem 8.24 (magnetic field and work in classical mechanics).

Someone said "If a nation values anything more than freedom, it will lose its freedom, and the irony of it is that if it is comfort or money that it values more, it will lose that too." We might also say, I think, "If a student values anything more than sweat and true knowledge, the student will lose knowledge, and the irony of it is that if it is easy solution or easy grade that the student values more, the student will lose that too."
