Homework 7
Due at the beginning of class March 5

1. You will model the ocean as a conductor to determine if you can find the Titanic using a 'probe' consisting of a conductor suspended below a moving ship and held at a potential of 100 V. Assume that no current can flow anywhere but to the ocean bottom made of rock which is at ground (or 0 Volts) potential. Most of this bottom is covered with thick silt which acts somewhat as an insulator allowing only a small amount of current to flow through it to the rock bottom. The Titanic rests on the rock bottom, not the silt, and therefore is at ground potential. Using the relaxation method solve for the potential at three prositions of the probe laterally displaced relative to the Titantic. Explain how you set up the boundary conditions and how you would calculate the total current from the probe using this solution.

2. Complete the details of the derivation of the wave equation, as described in the lecture notes of Mar. 19.

3. Complete the details of the application of Maxwell's equations in both integral and differential form, as described in the lecture notes of Mar. 19, on the plane electromagentic wave.

4. Complete the details of the perturbative application of Maxwell's equations, as described in the lecture notes of Mar. 19, on the capacitor driven by a harmonic source.

5. Complete the details of the derivation of Poynting's theorem, as described in the lecture notes of Mar. 21.

6. MORE PROBLEMS WILL FOLLOW LATER.