DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

24.8200 Engineering Electromagnetics

ASSIGNMENT 3

Due Date: Tuesday October 10, 2006 **Instructor:** **J. LoVetri**

Note: You can use any references you like, but make sure that your solutions are complete.

1)   Show that the instantaneous Poynting vector, $\mathbf{S}$, is related to the complex Poynting vector, $\mathbf{S}$, by the expression $\mathbf{S} = Re\{\mathbf{S} + E \times He^{j2\omega t}\} \neq Re\{\mathbf{S}e^{j\omega t}\}$.

2)   Given the open-faced conducting cube shown below, if the time-harmonic fields on the face of the cube are given as $E_z = 100\sin(\pi y)$, $H_y = e^{j\pi/6}\sin(\pi y)$, and no sources exist within the cube, determine

a) the time-average power dissipated within the cube, and

b) the difference between the time-average electric and magnetic energies within the cube.