PREFLIGHTS **LESSON 38 – ELECTROMAGNETISM IN THE 4-VECTOR (TENSOR) NOTATION (CONT.)**

LEARNING OBJECTIVE:
Taking account of relativistic transformations, formulate Maxwell's equations and the Lorentz force law using 4-vector and tensor notation.

1) Gauss's law comes from $\frac{\partial F^{\mu\nu}}{\partial x^{\nu}} = \mu_0 J^{\mu}$, where $\mu = 0$. What is the other one of Maxwell's equations that comes from the field tensor $F^{\mu\nu}$? What does μ equal for that equation?

2) Which two Maxwell's equations come from $\frac{\partial G^{\mu\nu}}{\partial x^{\nu}} = 0$? What does μ equal to get each of those equations?

3) If magnetic monopoles existed, then presumably there would be two current density 4-vectors, one for electric charge and electric current, J_e^{μ}, and one for magnetic charge and magnetic current, J_m^{μ}. How would Maxwell's equations, as expressed in Equation 12.126, change if there were magnetic monopoles? You may want to refer to Section 7.3.4.

4) ***Note: This is a review question from Chapter 11.*** Which type of radiation tends to dominate – electric dipole radiation or magnetic dipole radiation?

a. electric dipole radiation
b. magnetic dipole radiation
c. They're both about the same.

5) What did you find difficult or confusing in the pre-class work? If nothing was difficult or confusing, tell me what you found most interesting. Please be as specific as possible.

6) Document whatever help you received on the preclass work.