

EEL 3473 – FALL 2009  
HOMEWORK # 1  
DUE WEDNESDAY, SEPTEMBER 2, 2009

1. Write Maxwell's 4 equations in point and integral form. Identify vectors properly. Show how to transform between the point and integral forms. Sketch the origin and derivation of each of the 4 equations.
2. Verify the validity of the following vector identities in any one of the three common coordinate systems using the expressions for divergence, curl, and gradient found on the inside back cover of the text.

$$\nabla \times (\nabla \Phi) = 0 \text{ where } \Phi \text{ is any scalar}$$

$$\nabla \cdot (\nabla \times \vec{A}) = 0 \text{ where } \vec{A} \text{ is any vector}$$

$$\nabla \times (\nabla \times \vec{A}) = \nabla (\nabla \cdot \vec{A}) - \nabla^2 \vec{A}$$

3. Write down the fundamental definitions of curl and divergence and draw a picture to illustrate them.
4. Read Ulaby, Chapter 6, and start reading Leyser and Wong (2009) and Cannon (2009).