

*Phys 3330 Electricity & Magnetism II*  
*Spring 2017*  
*Assignment #7 - due Friday April 14<sup>th</sup> 2017*

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1. Show that the energy density associated with the electric field of a wave and the energy density associated with the magnetic field are equal. (Assume that the wave is traveling in a LIH material.)
2. Find the electric and magnetic field amplitudes for the following:
  - a. Sunlight, with a Poynting vector of  $1400 \text{ W/m}^2$ .
  - b. A HeNe laser, with a rating of  $1 \text{ mW}$  in a spot which is  $2 \text{ mm}$  in diameter.
  - c. The laser at the National Ignition Facility in Livermore, with a rating of  $10.4 \text{ kJ}$  in a light pulse which is  $3.5 \text{ ns}$  long and  $40 \text{ cm}$  in diameter.  
(See [http://www.llnl.gov/nif/milestones/world\\_record.html](http://www.llnl.gov/nif/milestones/world_record.html))  
Note for comparison: you will produce a 'lightning' strike in dry air if the electric field exceeds about  $30 \text{ MV/m}$ .
3. What is Brewster's angle for light in glass ( $n = 1.56$ ) falling on a boundary with air ( $n = 1$ ).
4. What is the critical angle for total internal reflections for light in glass ( $n = 1.56$ ) falling on a boundary with air ( $n = 1$ ).