PHYS 205-Section 03
Electricity and Magnetism - Winter 2018
Assignment 6 – Due on April 17th in class

Problems

1. A solenoid having an inductance of 6.30 mH is connected in series with a 1.20 $k\Omega$ resistor. (a) If a 14 V battery is connected across the pair, how long will it take for the current through the resistor to reach 80% of its final value? **(3 points)**
   (b) What is the current through the resistor at time $t = 1\ \tau_L$? **(2 points)**

2. An alternating source drives a series RLC circuit with an emf amplitude of 6 V, at a phase angle of $+30.0°$. When the potential difference across the capacitor reaches its maximum positive value of $+5\ V$, what is the potential difference across the inductor (sign included)? **(5 points)**

3. An air conditioner connected to a 120 $V\ rms$ AC line is equivalent to a 12 Ω resistance and a 1.30 Ω inductive reactance in series. Calculate
   (a) the impedance of the air conditioner **(3 points)**
   (b) the average rate at which energy is supplied to the appliance **(2 points)**

4. A plane electromagnetic wave of intensity $6\frac{W}{m^2}$, moving in the x direction, strikes a small perfectly reflecting pocket mirror, of area 40 cm^2, held in the yz plane.
   (a) What momentum does the wave transfer to the mirror each second? **(0 points)**
   (b) Find the force the wave exerts on the mirror. **(0 points)**