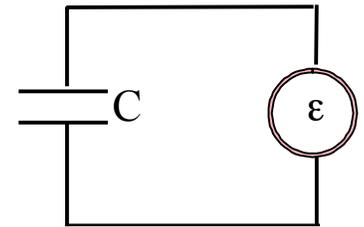
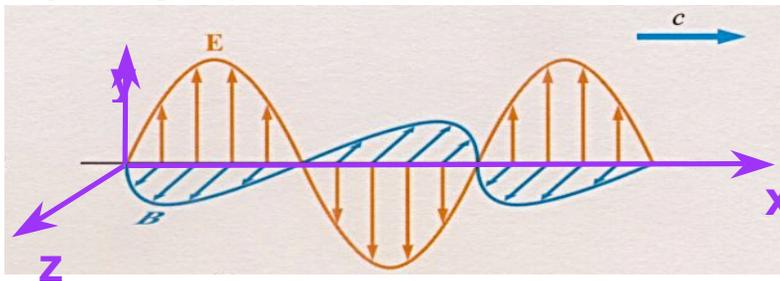
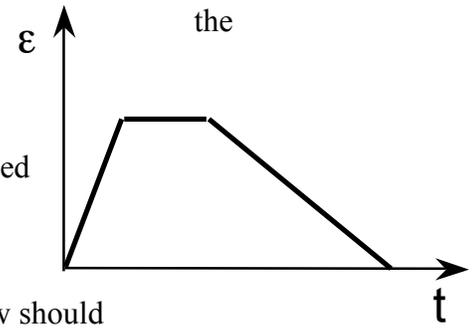
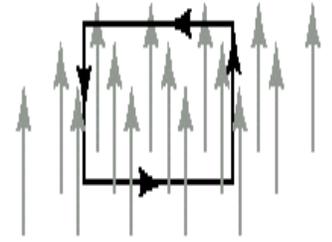


Midterm II SAMPLE

Part I – Concept Questions (15 points each).

1. A rectangular loop is placed in a uniform magnetic field with the plane of the loop parallel to the direction of the field. If a current is made to flow through the loop in the sense shown by the arrows: (a) what is the net force on the loop (b) what is the net torque ?
2. Consider a toroid made of N turns carrying a current i . Find magnetic field inside the toroid.
3. A circuit consisting of capacitor C and voltage source e is constructed as shown. The graph shows the voltage presented to the capacitor as a function of time. Draw the time dependence of the current i in the circuit.
4. Consider an electromagnetic wave as illustrated below. How should you orient your dipole antenna in order to best receive this signal? Explain your answer.



Part II – Analytical Problem (40 points)

An AC circuit consists of an alternative emf of 1 V connected to a resistor of 500 Ohms, an inductance of 0.4 mH, and two capacitors connected in parallel of 50 pF each, We want to find the resonance frequency of this circuit, the maximum power dissipated by the resistance, and at what frequencies ω will it be half as large.

- a. Draw the circuit and includes all the relevant quantities for this problem. What quantities do you need to find ω_0 , P_{\max} , and ω 's? (10 pts)
- b. What concepts and equations will you use to solve this problem? (5 pts)
- c. Solve for ω_0 , P_{\max} , and ω 's in term of symbols. (15 pts)
- d. Solve for ω_0 , P_{\max} , and ω 's in term of numbers. (5 pts)
- e. Verify the units, and verify if your values are plausible. (5 pts).