Physics 251
Homework

1. Consider a rectangular loop of wire with a length of 15 cm and width 10 cm moving with a speed of 1 cm/s through a magnetic field of magnitude 2 T directed out of the page (see below). The loop contains a small 0.5 Ω resistor and is 2 cm from the end of the magnetic field at t=0s. A) Determine the magnitude of the electric potential across the resistor at t = 0s. B) Determine the magnitude of the electric potential across the resistor at t = 5 s. C) Determine the magnitude and direction of the current through the resistor at t = 0 s. D) Determine the magnitude and direction of the current through the resistor at t = 5 s. E) Graph the electric potential across the 0.5Ω resistor as a function of time on the grid provided. F) How much energy will be dissipated by the resistor during the time it takes the loop to entirely leave the magnetic field. Explain. G) How much work would you have to do to drag the loop from the magnetic field? Explain. H) How is Lenz's law related to conservation of energy? Explain.