HW 10 Additional Problems

1. A uniform electric field of magnitude 250 V/m is directed in the positive x direction. A +12 μC charge moves from the origin to the point (x, y) = (20 cm, 50 cm). (a) what was the change in the potential energy of this charge? (b) Through what potential difference did the charge move?
   a. -6.0×10^{-4} J, b. -50V
2. The plates of a parallel-plate capacitor are separated by 0.100 mm. If the material between the plates is air, what plate area is required to provide a capacitance of 2.00 pF?
   2.26×10^{-5} m^2
3. Consider the parallel-plate capacitor formed by the Earth and a cloud layer is described in Problem 25. Assume this capacitor will discharge (i.e., lightning occurs) when the electric field strength between the plates reaches 3.0×10^6 N/C. What is the energy released if the capacitor discharges completely during a lightning strike?
   3.17×10^{10} J