22.4, E due to a line of charge

1. A long straight wire has a uniform charge density of -6μ C/m.

   (a) Sketch what this looks like.

   (b) Calculate the length of wire that would correspond to a total charge of -1.5μC.

2. A ring has a radius of 2m. an arc of length 0.5m has a charge of $+8\mu$C.

   (a) Sketch what this looks like

   (b) Calculate the linear charge density, λ.

   (c) Calculate the total charge of the circle

3. Consider a straight wire of length L on the lying on the x-axis. It has a uniform charge density λ. Determine the electric field at some point $x = P$ along the x-axis.
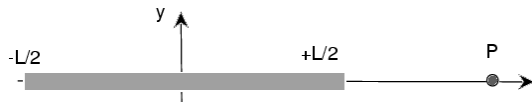
   (a) Sketch what this looks like. Include a dq, the distance r, and any angle θ that might be helpful.

   (b) Sketch $d\vec{E}$ from your dq. What component(s) of the resulting $\vec{E}$ do you need to calculate?

   (b) Calculate E. You're welcome to leave this as an integral, but include limits, and simplify as much as possible (in particular, move all constants out of the integral).

4. Consider a half circle. It has a total charge of Q and a radius a. Determine the electric field at the circle's center.
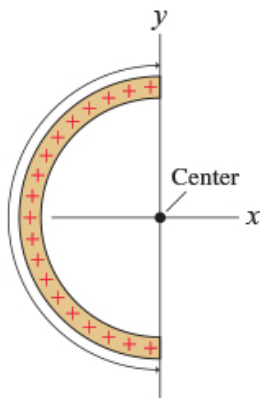
   (a) Sketch what this looks like. Include a couple of dq's, the distance r, and any angle θ that might be helpful.

   (b) Sketch $d\vec{E}$'s from your two dq's. What component(s) of the resulting $\vec{E}$ do you need to calculate? You'll have to choose the dq's wisely

   (c) Calculate E. You'll be able to do the integral. Do it, yes?

22-5 E due a charged disk

1. Write down equation 22-23.

   What do dq, σ, and dA represent?

   Give the units associated with each one.

2. Write down equation 22-26. What does this equation describe?

   (a) Use words. Include what the charge distribution looks like, and what points in space this applies to.
   (b) Use a sketch. Label z and R in your sketch.

3. Write down equation 22-27. What does this equation describe?

   (a) Use words.
   (b) Use a sketch. (Hint: It's in this chapter, but not in this section. Or you can search for it on the web.)