Do the following problems from the text

P.3-24
P.3-27
P.3-30
P.3-32 Plot the electric field as a function of radius. What is the bound surface charge density at r=b?
P.3-34 Plot D(r) and E(r) in the dielectric. Note the similarity to problem 3-30.

• A very long co-axial transmission line of length L, inner radius r_i and outer radius r_o is filled with a nonuniform dielectric material \( \varepsilon(r) = \varepsilon_0 \frac{r_o}{r} \). The outer conductor is held at ground potential and a positive charge Q is placed on the inner conductor.

  a) Find \( E(r) \), \( D(r) \), and the polarization density \( P(r) \) in the dielectric.

  b) What is the capacitance per unit length?

  c) Find the bound volume charge density in the dielectric.

P.3-46