

Chapter 24 – Problems 2, 21\*, 33\*, 42\*, 49

Chapter 25 – Problems 18\*, 21\*, 24\*, 30

### Additional Problem

A An infinite solid cylinder of radius  $R$  has a nonuniform charge density given by  $\rho(r) = Cr$ .

Find expressions for the electric field as a function of position for  $r < R$  and for  $r > R$ .

B We have a pair of large capacitor plates oriented and charged as shown in the following diagram. We also have a particle of mass  $m$ , carrying charge  $+q$  so small that its presence has no effect on the charge distribution on the plates. No gravitational or other forces are to be considered. The potential difference between the plates is denoted by  $\Delta V$ , the spacing between the plates by  $\Delta s$ , and the magnitude of the electrical field strength between the plates by  $E$ .

- Suppose that our test particle is placed successively at positions A, B, and C. Show, on a force diagram for the particle, the force acting on the particle at each one of these positions. If the force happens to be zero, say so explicitly. Explain your reasoning.
- If the test particle is displaced from position D to position E, what amount of work must be done on (or taken out of) the system? Explain your reasoning.
- If the test particle is displaced from position F to position G, what amount of work must be done on (or taken out of) the system? Explain your reasoning.

