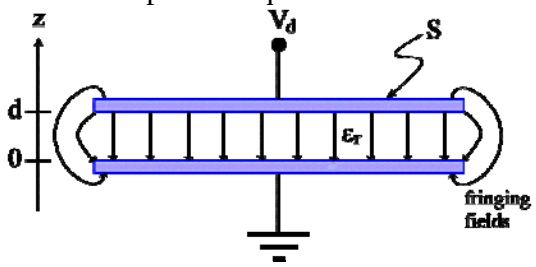
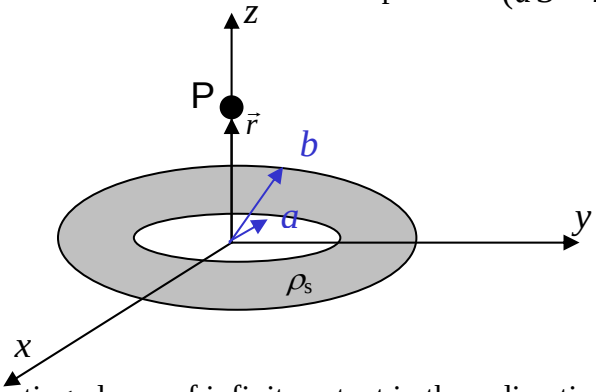
1. (10%) Please determine the voltage and electric field between two conductor plates with the method of Laplace's equation.

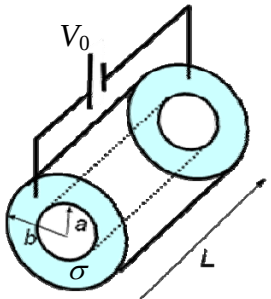


2. (20%) Please calculate the electric field $\vec{E}$ at point **P**. $(d\vec{S} = rd\phi dr\hat{z})$



3. (20%) Two conducting planes of infinite extent in the *z*-direction are at $\phi = 0^o$ and $\phi = 60^o$. A point charge *q* is situated at (2, π/6, 0) when both plates are at ground potential. Find the potential at a point (5, π/6, 0).

4. (15%) Calculate the DC resistance of a cylindrical conductor shell (σ is a constant).



5. (15%) A certain amount of charge is placed within an isolated conductor. The current through a closed surface bounding the charge is observed to be $i(t) = 0.15e^{-25t}$ A. Determine (a) the relaxation time, (b) the initial charge, and (c) the charge transported through the surface in time $t = 4\tau$.

6. (20%) A coaxial cable is used to carry electric power. Assume that the radius of the inner conductor is 3 (mm), and the dielectric constant of insulating material is 2.1. Design a cable that is to work at a voltage rating of 20 (kV). Please determine the outer radius for the maximum electric field intensities in the insulating material not to exceed 25% of their dielectric strength 20×10^6 (V/m).