Homework 4
Fields and Waves I
Fall 2008

Charge Distribution

1.
 The radially dependent volume charge density $\rho_v = 4.3r^2$ [C/m^3] exists within a sphere of radius $r = 2$ cm. Find the total charge Q contained by that sphere.

Gauss's Law

2.   A long cylinder of radius 0.025 meters has a volume charge density which is proportional to the distance from the axis, $\rho_v = 0.005r$. Find the vector electric field inside the cylinder using Gauss' Law in integral form. Show the Gaussian surface and the electric field direction.
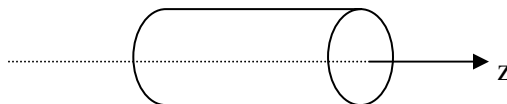
3. Three long parallel sheets of charge are located as indicated below Find the electric field in all regions of space.

ρ_{s1} ρ_{s2} ρ_{s3}

X

0   a   b
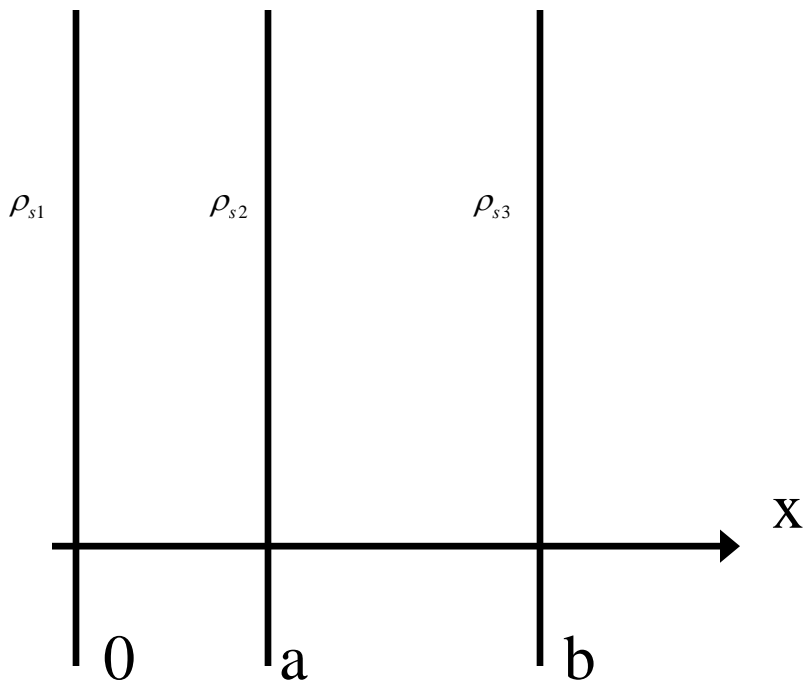
4. Four charges are indicated below. Sketch the flux lines indicating direction. Indicate any planes of symmetry and describe these (eg. All lines are parallel, or all lines are perpendicular) Sketch in a few lines perpendicular to the flux lines as well.

+ Q   - Q
●   ●

●   ●
- Q   + Q