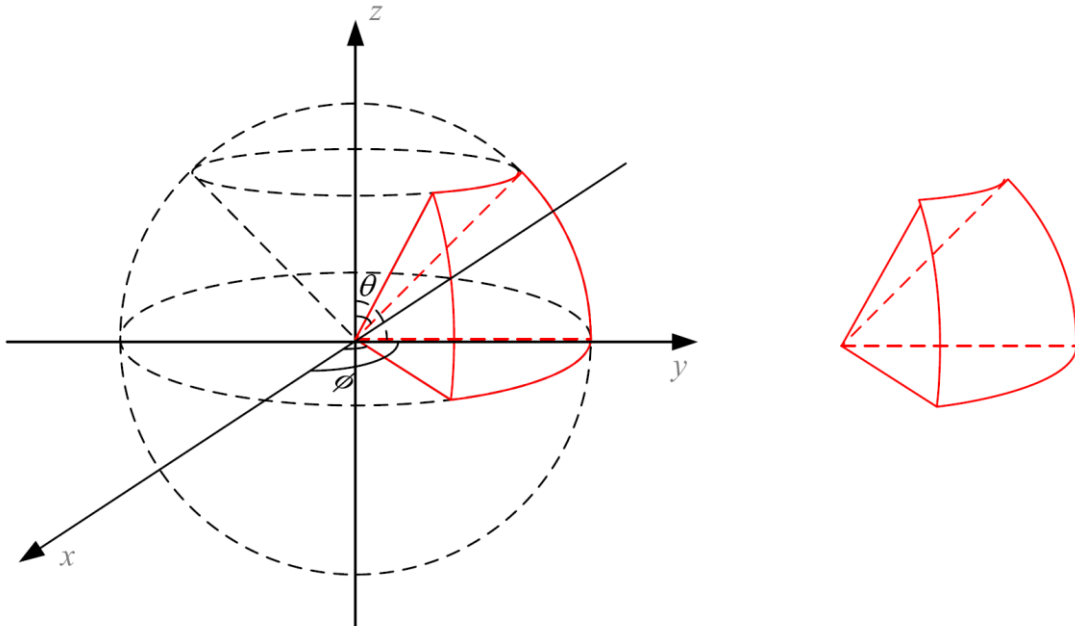
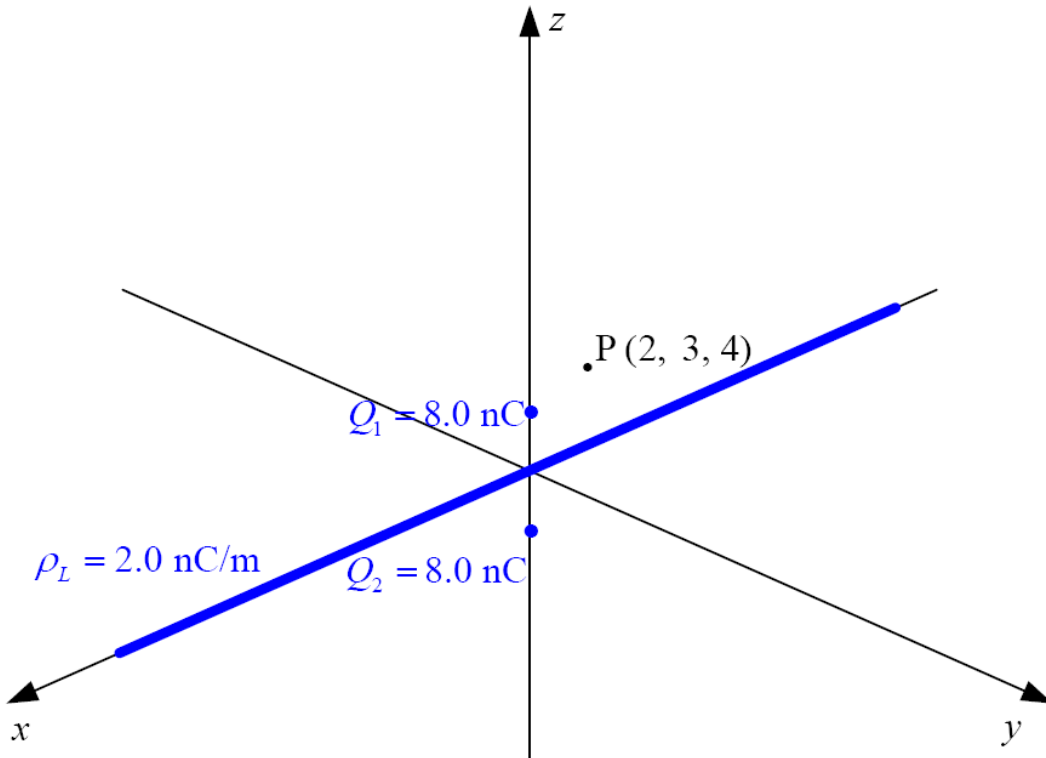


Home Assignment – 3 and 4

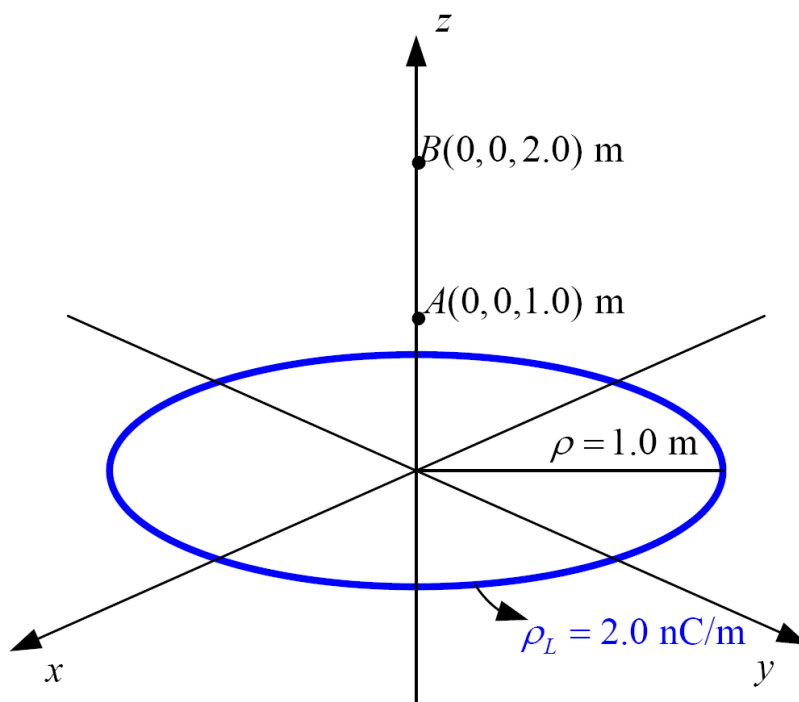
1. The surfaces $r = 0$, $r = 2$, $\varphi = 45^\circ$, $\varphi = 90^\circ$, $\theta = 45^\circ$, and $\theta = 90^\circ$ define a closed surface as shown below. Find the enclosed volume and the area of the closed surface S . Write a MATLAB program to find the enclosed volume and the area of the closed surface.



2. An infinite uniform linear charge $\rho_L = 2.0 \text{ nC/m}$ lies along the x-axis in free space, while point charges of 8.0 nC each are located at $(0, 0, 1)$ and $(0, 0, -1)$ as shown below. Write a MATLAB program to find \vec{E} at $(2, 3, 4)$.



3. A ring linear charge with a charge density $\rho_L = 2.0 \text{ nC/m}$ is located on the x-y plane as shown below. Write a MATLAB program to find the potential difference between point A (0, 0, 1.0) and point B (0, 0, 2.0).



4. A current sheet $\vec{K} = 5.0\hat{a}_y \text{ A/m}$ flows in the region $-0.15\text{m} < x < 0.15\text{m}$. Write a MATLAB program to calculate \vec{H} at $P(0,0,0.25)$ and plot the magnetic field in the x-y plane in the region: $-0.5\text{m} \leq x \leq 0.5\text{m}$ and $-0.5\text{m} \leq z \leq 0.5\text{m}$.

