

2.15

$$\rho = \frac{k}{r^2}$$



Case 1: outside  $r > b$

$$Q_{enc} = \int \rho dz = 4\pi k \int_a^b r^{-2} r^2 dr = 4\pi k (b-a)$$

$$|\vec{E}_1| 4\pi r^2 = \frac{4\pi k (b-a)}{\epsilon_0} \Rightarrow \vec{E}_1 = k \frac{b-a}{\epsilon_0 r^2} \hat{r}$$

Case 2: inside thickness ( $a \leq r \leq b$ )

$$Q_{enc} = \int \rho dz = 4\pi k \int_a^r r^{-2} r^2 dr = 4\pi k (r-a)$$

$$\Rightarrow \vec{E}_2 = k \frac{r-a}{\epsilon_0 r^2} \hat{r}$$

Case 3: fully inside ( $r < a$ )

$$Q_{enc} = 0 \Rightarrow \vec{E}_3 = 0$$