

58. (a) and (b) There is no flux through the sides, so we have two contributions to the flux, one from the  $x = 2$  end (with  $\Phi_2 = +(2 + 2)(\pi(0.20)^2) = 0.50 \text{ N}\cdot\text{m}^2/\text{C}$ ) and one from the  $x = 0$  end (with  $\Phi_0 = -(2)(\pi(0.20)^2)$ ). By Gauss' law we have  $q_{\text{enc}} = \varepsilon_0 (\Phi_2 + \Phi_0) = 2.2 \times 10^{-12} \text{ C}$ .