

61. (a) For  $r < R$ ,  $E = 0$  (see Eq. 24-16).

(b) For  $r$  slightly greater than  $R$ ,

$$\begin{aligned} E_R &= \frac{1}{4\pi\epsilon_0} \frac{q}{r^2} \approx \frac{q}{4\pi\epsilon_0 R^2} = \frac{(8.99 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2)(2.0 \times 10^{-7} \text{ C})}{(0.25 \text{ m})^2} \\ &= 2.9 \times 10^4 \text{ N/C} . \end{aligned}$$

(c) For  $r > R$ ,

$$E = \frac{1}{4\pi\epsilon_0} \frac{q}{r^2} = E_R \left( \frac{R}{r} \right)^2 = (2.9 \times 10^4 \text{ N/C}) \left( \frac{0.25 \text{ m}}{3.0 \text{ m}} \right)^2 = 200 \text{ N/C} .$$