

Ee0 Test B 2005/2016: Solutions

$$a) \quad \vec{E}_{\text{Dipol}}(0) = 0; \quad \vec{E}_{\text{charge}}(0) = + \frac{Q}{4\pi\epsilon_0} \frac{1}{4R^2} \vec{e}_z$$

e

$$\vec{E}(0) = + \frac{Q}{4\pi\epsilon_0} \frac{1}{4R^2} \vec{e}_z$$

$$b) \quad \phi(z) = \frac{Q}{4\pi\epsilon_0} \left[ -\frac{1}{z-2R} + \frac{z}{3R^2} \left( \sqrt{4R^2+z^2} - \sqrt{R^2+z^2} \right) \right]; \quad z > 2R$$

$$c) \quad \phi(z) \approx -\frac{Q}{4\pi\epsilon_0} \frac{2R}{z^2} + \mathcal{O}\left(\frac{1}{z^3}\right)$$

$$d) \quad \vec{p} = -Q2R \vec{e}_z$$