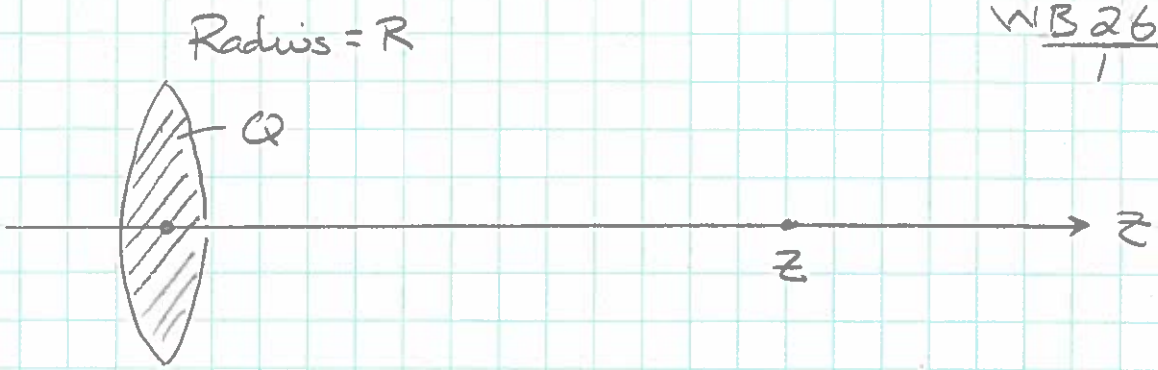

From Chap. 28, example 25-11:

$$V(z) = \frac{Q}{2\pi\varepsilon_0 R^2}\left\{\sqrt{R^2+z^2} - z\right\} \quad \text{for } z>0$$

So:

$$E_z = -\frac{\partial V(z)}{\partial z} = -\frac{d}{dz}V(z)$$

$$= \frac{-Q}{2\pi\varepsilon_0 R^2}\left\{\frac{d}{dz}(R^2+z^2)^{1/2} - \frac{dz}{dz}\right\}$$

$$= \frac{-Q}{2\pi\varepsilon_0 R^2}\left\{\frac{1}{2}(R^2+z^2)^{-1/2}2z - 1\right\}$$

$$E_z = \frac{Q}{2\pi\varepsilon_0 R^2}\left\{1 - \frac{z}{\sqrt{R^2+z^2}}\right\}$$

which is the same as eqn 23.24 with

$$\eta = \frac{Q}{\pi R^2}$$