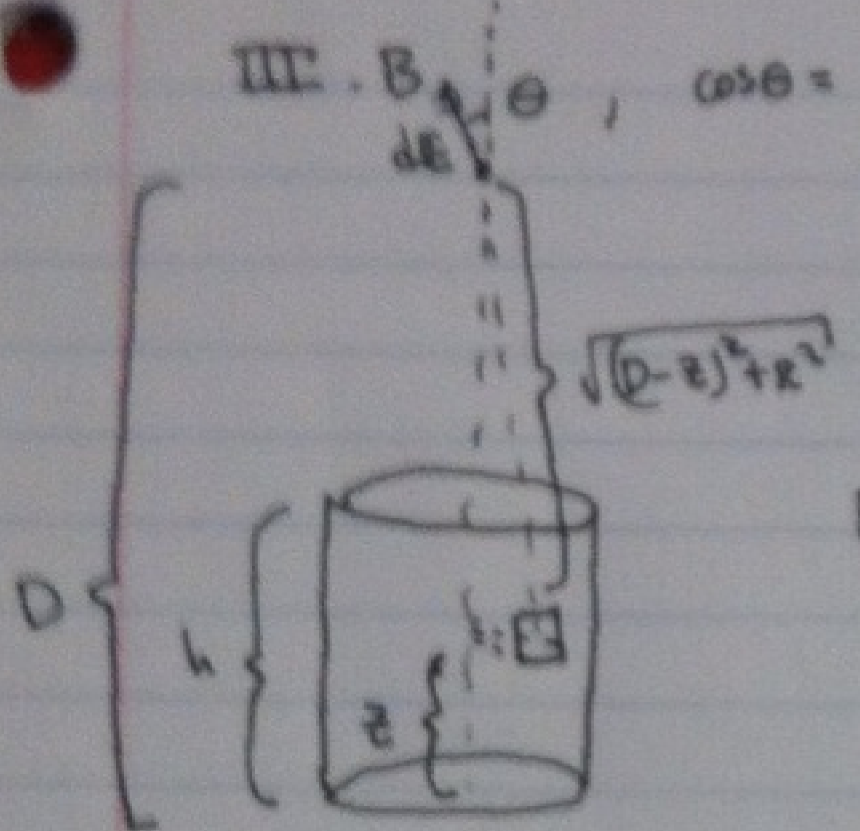
III. B



$$\cos\theta = \frac{dE_z}{dE} = \frac{D-z}{\sqrt{(D-z)^2+R^2}}$$

$$E = \frac{1}{4\pi\epsilon_0}\underbrace{\frac{Q}{2\pi R h}}_{\sigma}\int_0^{2\pi} d\phi\, R \int_0^h dz\, \frac{D-z}{\sqrt{(D-z)^2+R^2}^{\,3}}$$

$$= \frac{1}{4\pi\epsilon_0}\frac{Q}{2\pi R h}\, 2\pi R\left[\frac{1}{\sqrt{(D-h)^2+R^2}} - \frac{1}{\sqrt{D^2+R^2}}\right]$$

$$= \frac{Q}{4\pi\epsilon_0}\frac{1}{h}\left[\frac{1}{\sqrt{(D-h)^2+R^2}} - \frac{1}{\sqrt{D^2+R^2}}\right], \text{ assuming } D>h$$

E points ~~[illegible]~~ vertically, upwards if $Q>0$.

At large heights $D \to \infty$:

$$E \xrightarrow[D\to\infty]{} \frac{Q}{4\pi\epsilon_0}\frac{1}{h}\frac{h}{D^2} + \cdots = \frac{Q}{4\pi\epsilon_0}\frac{1}{D^2} + \cdots$$

as one would expect since, from large distances, we can approximate the cylinder by a point charge.