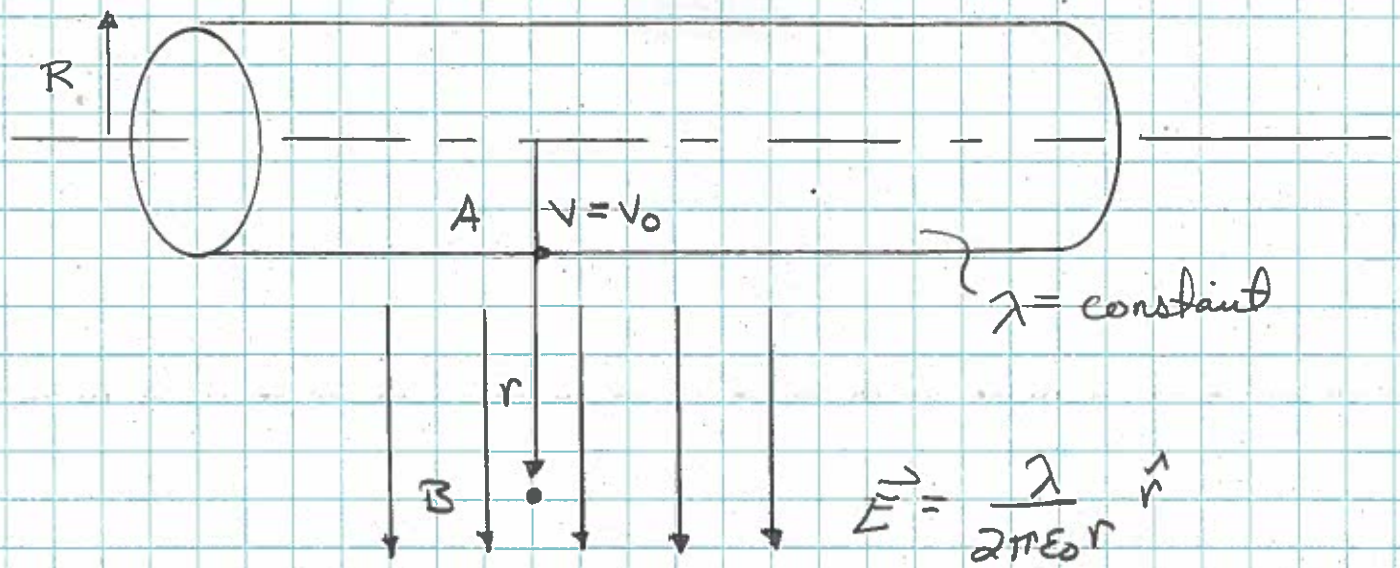

$$\vec{E} = \frac{\lambda}{2\pi\varepsilon_0 r}\hat{r}$$

$$\Delta V = V_B - V_0 = -\int \vec{E}\cdot d\vec{s}$$

$$\vec{E} = \frac{\lambda}{2\pi\varepsilon_0 r}\hat{r} \quad \& \quad d\vec{s} = dr\,\hat{r}$$

So $$\Delta V = -\int \vec{E}\cdot d\vec{s} = -\frac{\lambda}{2\pi\varepsilon_0}\int_R^r \frac{dr}{r}$$

$$\Delta V = -\frac{\lambda}{2\pi\varepsilon_0}\ln r\Big|_R^r = -\frac{\lambda}{2\pi\varepsilon_0}\{\ln(r) - \ln(R)\}$$

$$= -\frac{\lambda}{2\pi\varepsilon_0}\ln(r/R)$$

$\therefore$ $$\Delta V = V_B - V_0 = -\frac{\lambda}{2\pi\varepsilon_0}\ln(r/R)$$

$$V_B = V_0 - \frac{\lambda}{2\pi\varepsilon_0}\ln(r/R)$$