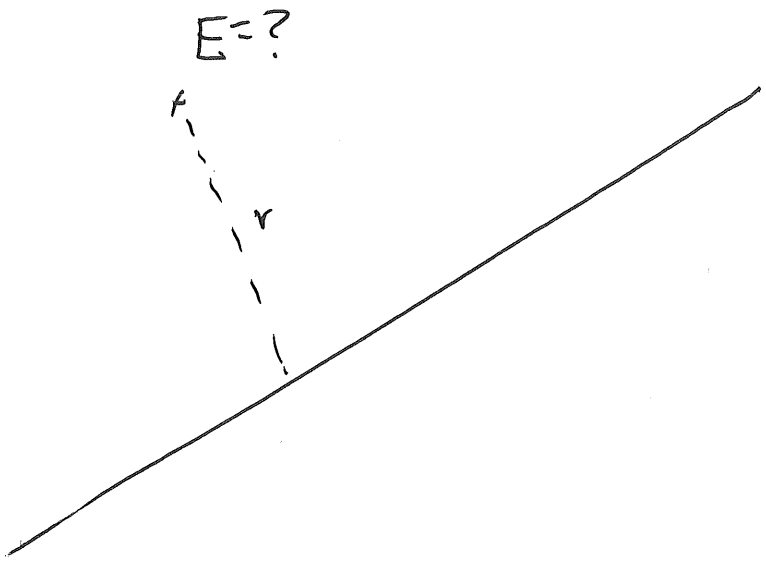
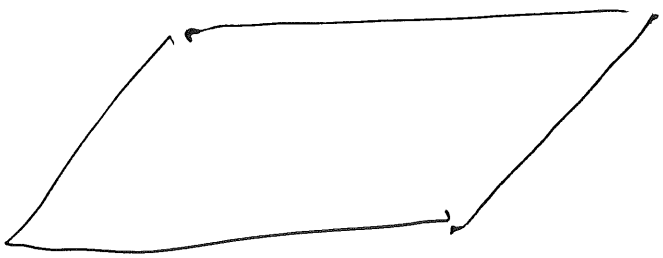
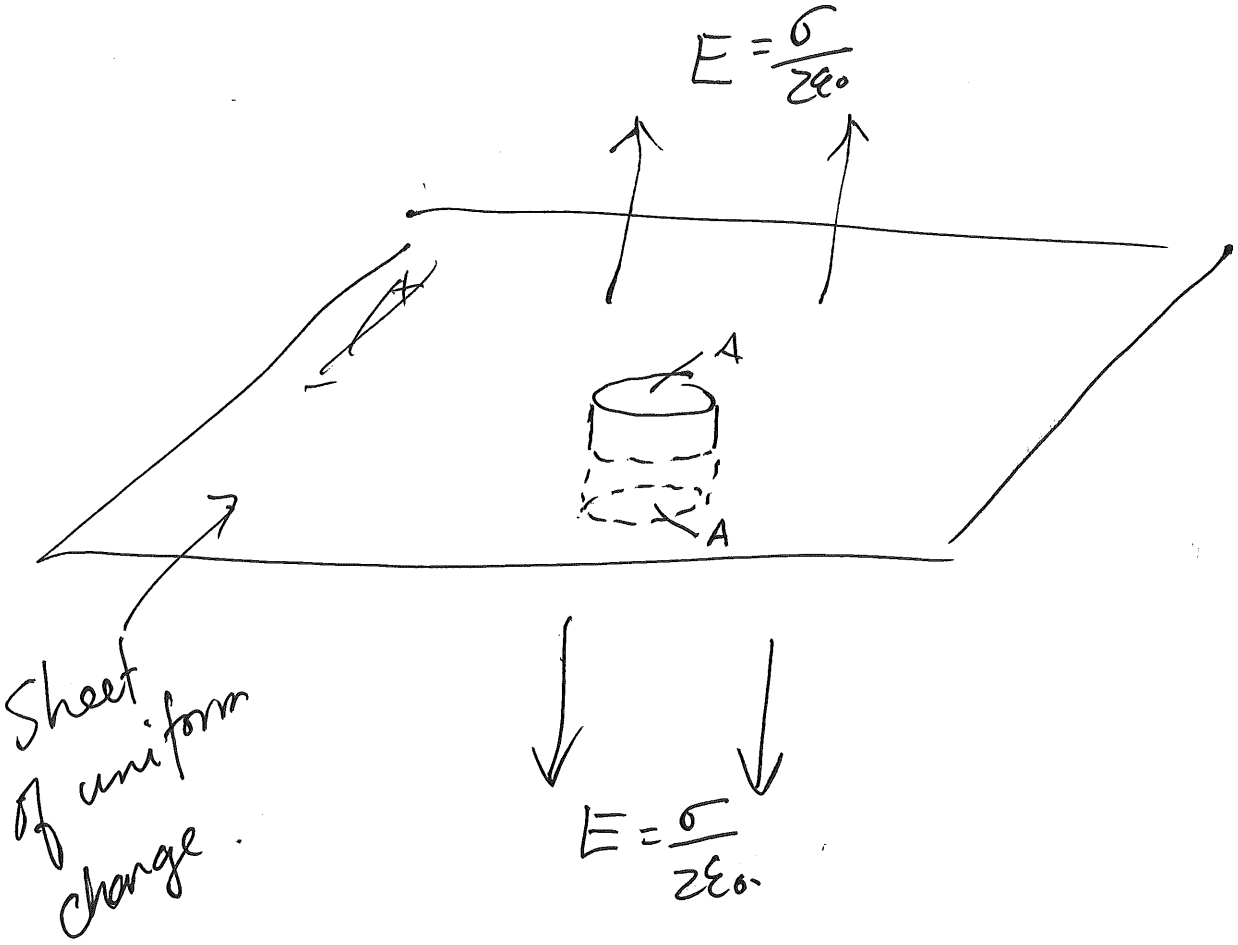


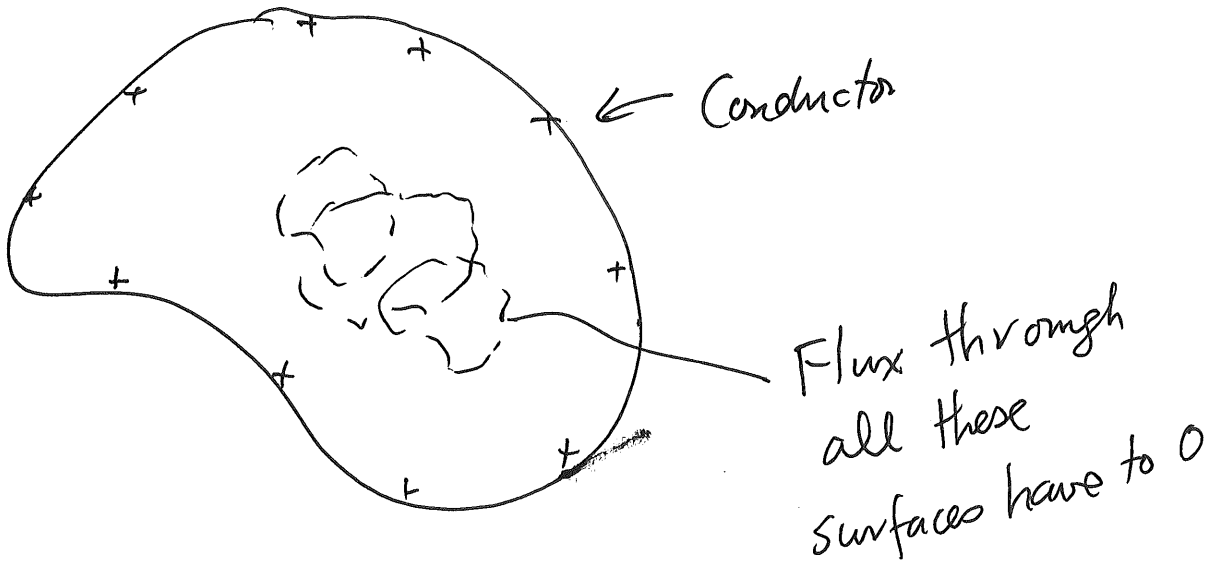
$$E = \frac{Q_{in}}{\varepsilon_0 (2\pi r L)}$$

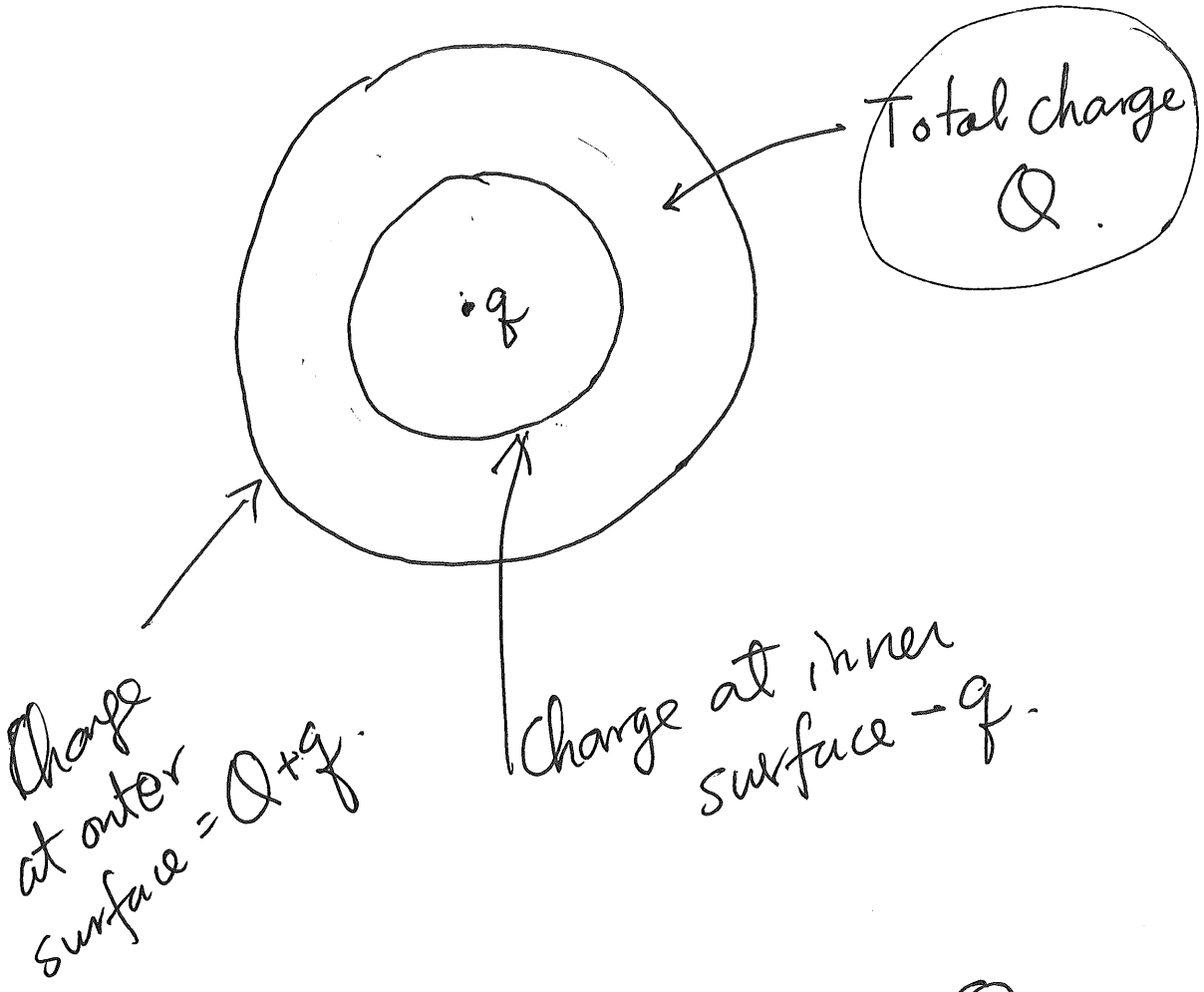
$$= \frac{\lambda}{\varepsilon_0 \cdot 2\pi r}.$$



$$E = \frac{Q_{in}}{\varepsilon_0 (2A)}. = \frac{\sigma}{2\varepsilon_0}$$


$E = \frac{\sigma}{2\varepsilon_0}$
A
A
A
Sheet of uniform charge.
$E = \frac{\sigma}{2\varepsilon_0}$

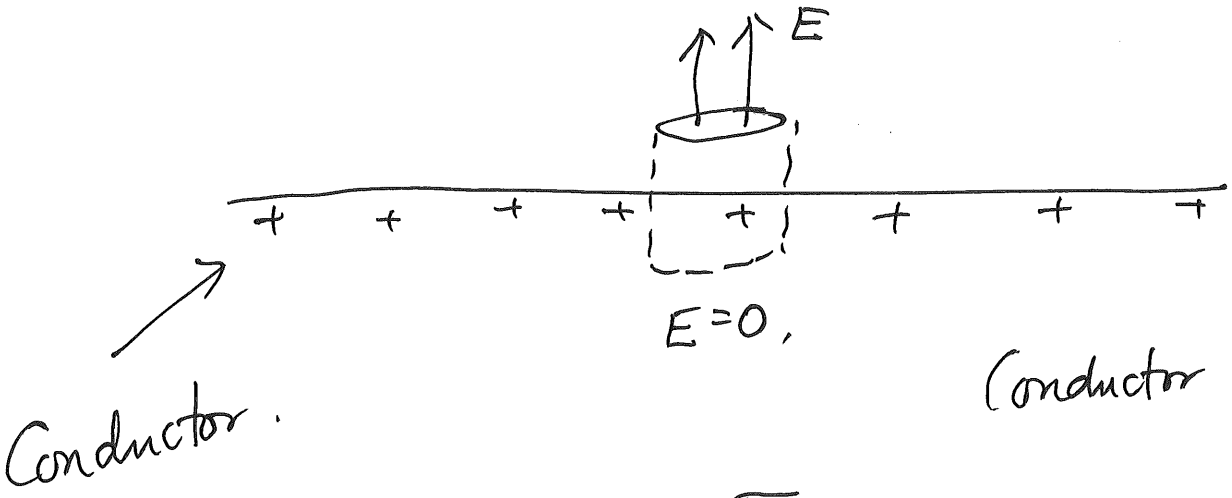

Conductor
Flux through all these surfaces have to 0



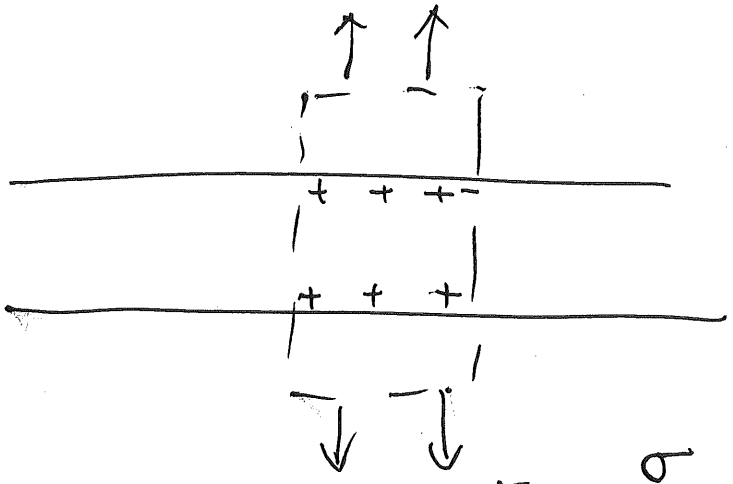
All time: $Q_{in} + Q_{out} = Q$.

If $Q_{in} = -q$.

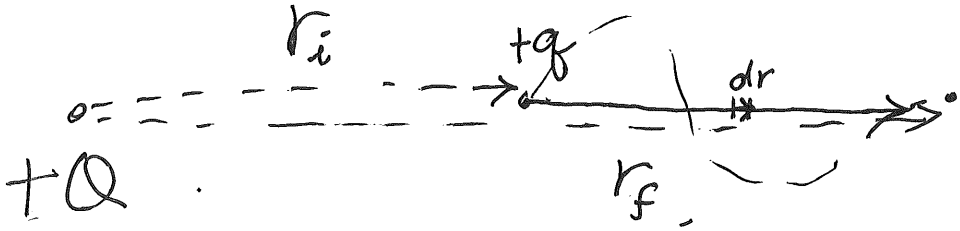
$Q_{out} = Q + q$.



$$E = \frac{\sigma}{\varepsilon_0}.$$



$$E = \frac{\sigma}{2\varepsilon_0}.$$



$$F_E = \frac{1}{4\pi\varepsilon_0}\frac{Qq}{r^2}$$ in the same direction as dr.

Work done by F_E

$$= \int \vec{F}_E \cdot d\vec{r}$$

$$= \int_{r_i}^{r_f} \left(\frac{1}{4\pi\varepsilon_0}\frac{Qq}{r^2}\right)(dr)\cos 0^\circ$$

$$= \left[-\frac{1}{4\pi\varepsilon_0}\frac{Qq}{r}\right]_{r_i}^{r_f} = \frac{Qq}{4\pi\varepsilon_0}\left(\frac{1}{r_i} - \frac{1}{r_f}\right).$$

$V_f - V_i$

$= -W$

$= \frac{Qq}{4\pi\varepsilon_0}\left(\frac{1}{r_f} - \frac{1}{r_i}\right).$