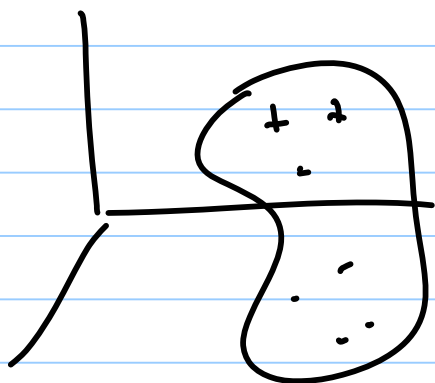
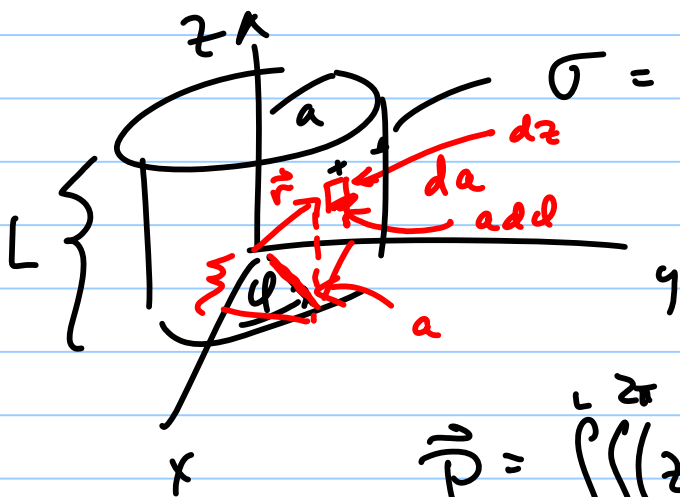


$$\vec{p} = \sum_i q_i \vec{r}_i$$



$$\vec{p} = \int \vec{r} dq$$



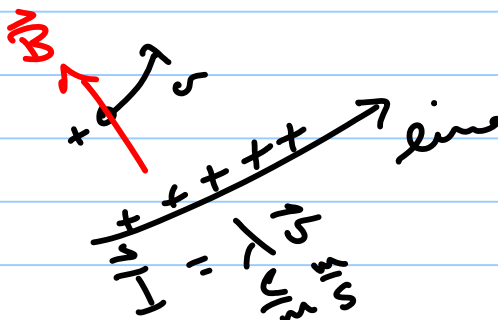
$$\sigma = \sigma_0 \omega \phi$$

$$\vec{r} = z \hat{z} + a \cos \phi \hat{x} + a \sin \phi \hat{y}$$

$$da = a d\phi dz$$

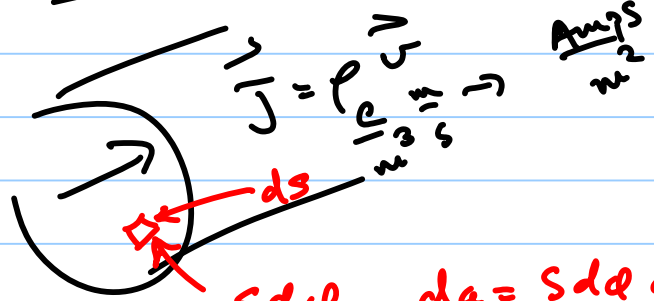
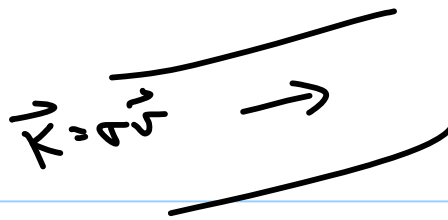
$$\vec{p} = \int_0^L \int_0^{2\pi} (z \hat{z} + a \cos \phi \hat{x} + a \sin \phi \hat{y}) \underbrace{\sigma_0 \omega \phi}_{\sigma} \underbrace{a d\phi dz}_{da} dg$$

$$\vec{F} = q \vec{E} \times \vec{B}$$





$$\frac{I_0}{2\pi a} = K$$



$I_0$   
 $\uparrow$  total current

$$J \propto \frac{1}{s}$$

$$J = \frac{\alpha}{s}$$

$$I_0 = \int J da = \int_0^a \int_0^{2\pi} \frac{\alpha}{s} s d\phi ds$$

$\uparrow$   $\frac{\text{amps}}{\text{m}^2}$

$$I_0 = \alpha 2\pi a$$

$$\alpha = \frac{I_0}{2\pi a}$$

$$J = \frac{\alpha}{s} = \frac{I_0}{2\pi a s}$$