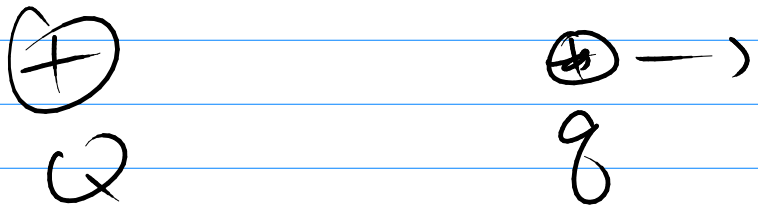
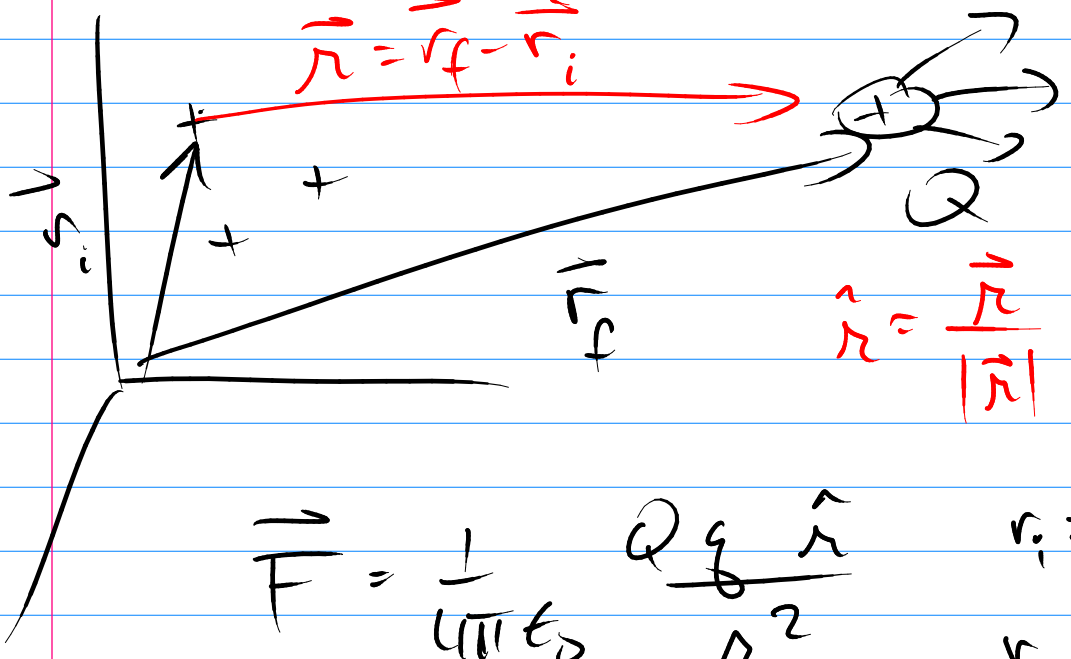
Coulomb's law

$$\vec{F} = \frac{1}{4\pi\epsilon_0}\frac{Qq}{r^2}\hat{r}$$



r^2 or $r^{2.0000001}$



$$\vec{F} = \frac{1}{4\pi\epsilon_0}\frac{Qq\,\hat{r}}{r^2}$$

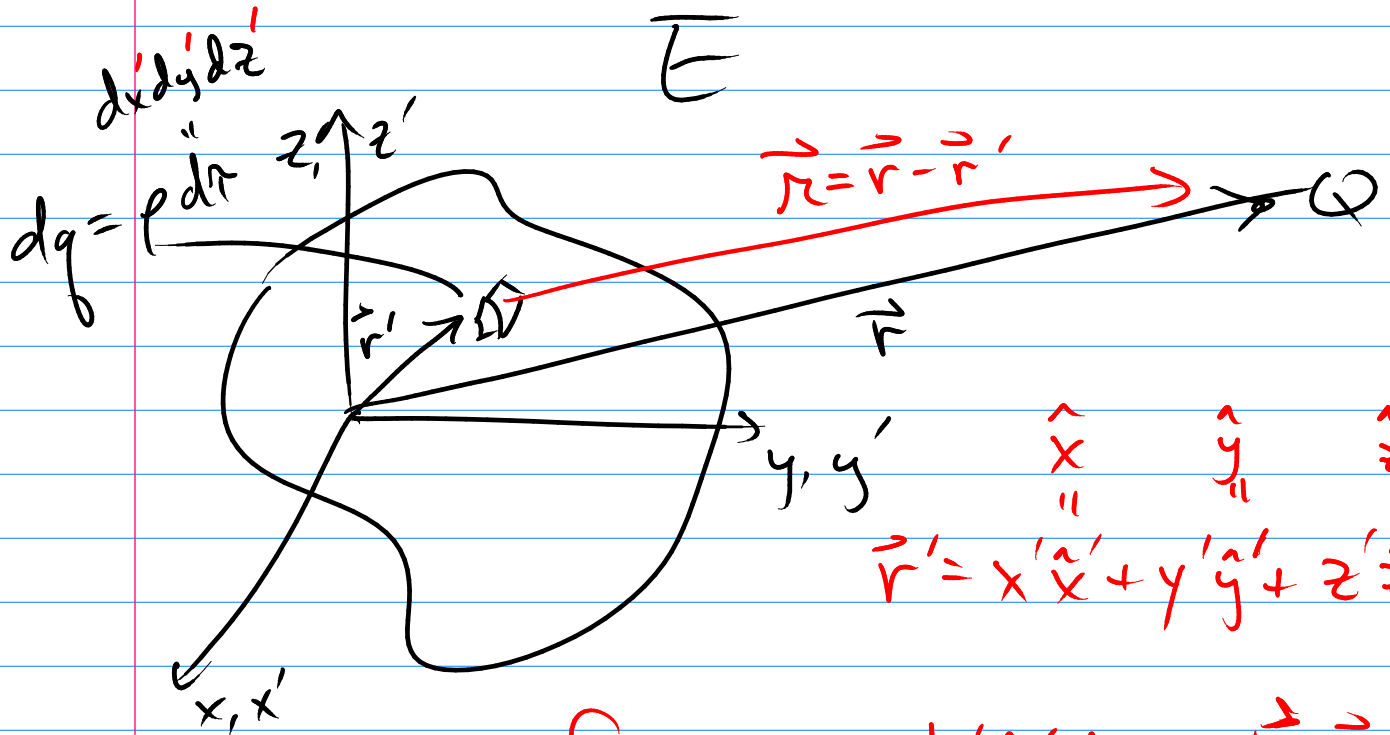
$r_i = (3, 1, 2)$

$r_f = (1, 3, 4)$

$$\vec{R} = -2\hat{x} + 2\hat{y} + 2\hat{z}$$

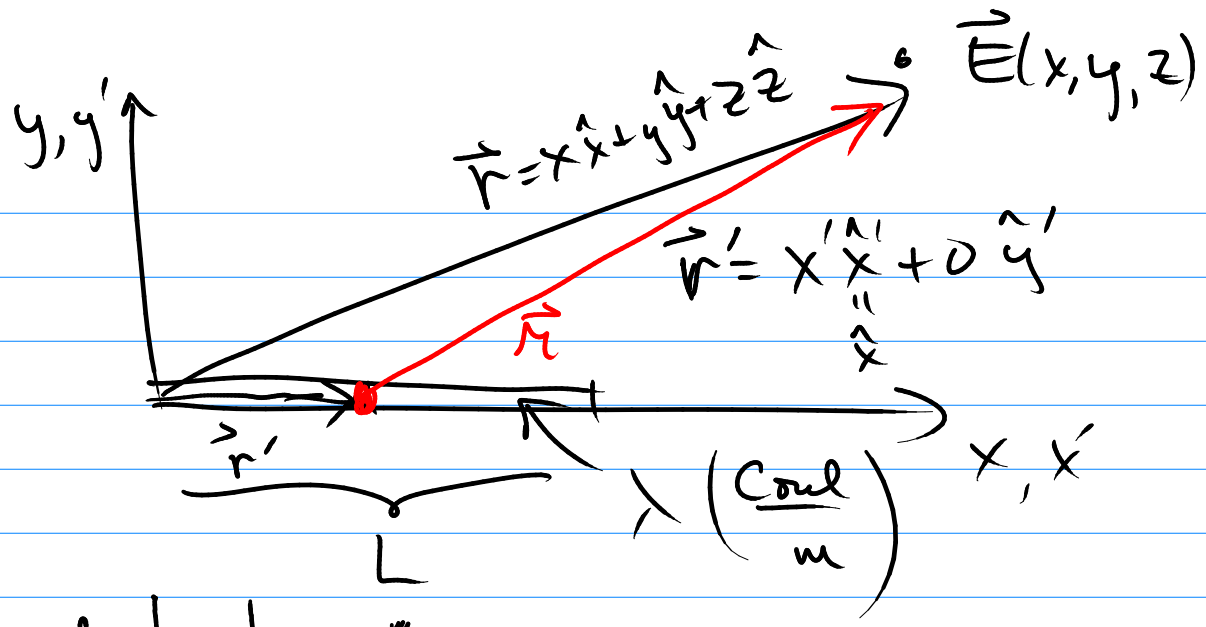
$$\vec{F}_{on\,Q} = \left(\sum_{i=1}^{N} \frac{q_i \hat{R}_i}{4\pi\epsilon_0 R_i^2} \right) Q = Q\vec{E}$$

$$\vec{E}$$



$$\vec{r}' = x'\hat{x}' + y'\hat{y}' + z'\hat{z}'$$

$$\vec{E} = \int \frac{1}{4\pi\epsilon_0} \frac{\rho\, dx'dy'dz}{|\vec{r} - \vec{r}'|^2} \frac{(\vec{r} - \vec{r}')}{|\vec{r} - \vec{r}'|}$$



need to know

$$\vec{\pi} = \vec{r} - \vec{r}' = (x - x')\hat{x} + y\hat{y} + z\hat{z}$$

$$|\vec{\pi}| = \sqrt{(x-x')^2 + y^2 + z^2}$$

$$dq = \lambda\, dx'$$

$$\vec{E} = \int_0^L \frac{1}{4\pi\epsilon_0} \frac{\lambda\, dx'}{\left[(x-x')^2 + y^2 + z^2\right]^{3/2}} \left[(x-x')\hat{x} + y\hat{y} + z\hat{z}\right]$$