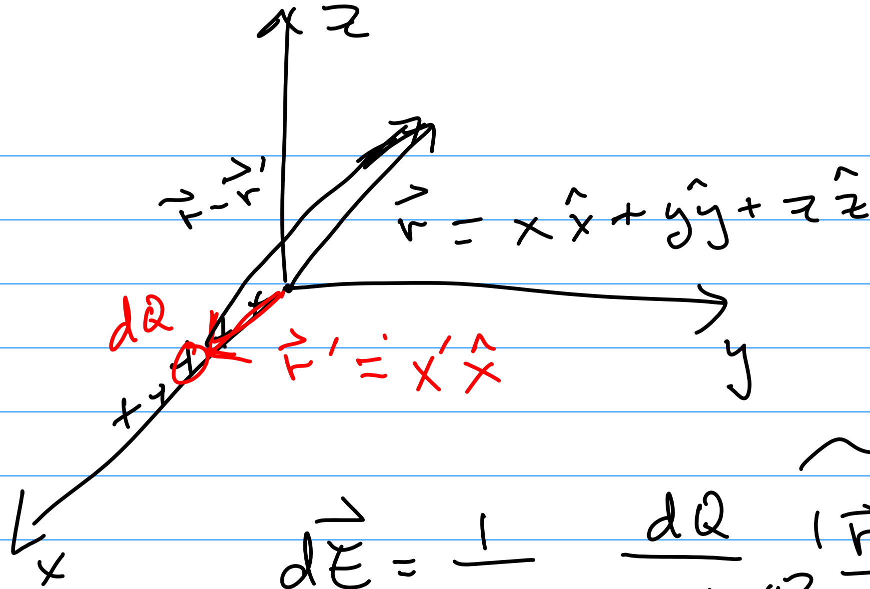
Review:



$$d\vec{E} = \frac{1}{4\pi\epsilon_0} \frac{dQ}{|\vec{r}-\vec{r}'|^2} \overbrace{\frac{(\vec{r}-\vec{r}')}{|\vec{r}-\vec{r}'|}}^{\hat{r}}$$

$$dQ = \lambda\, dx'$$

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

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

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

What questions do you have about this result?

As $\vec{r} \to \infty$ $\quad E \to \frac{1}{4\pi\epsilon_0} \frac{Q_{tot}}{r^2} \hat{r}$

$x >> x'$

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

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

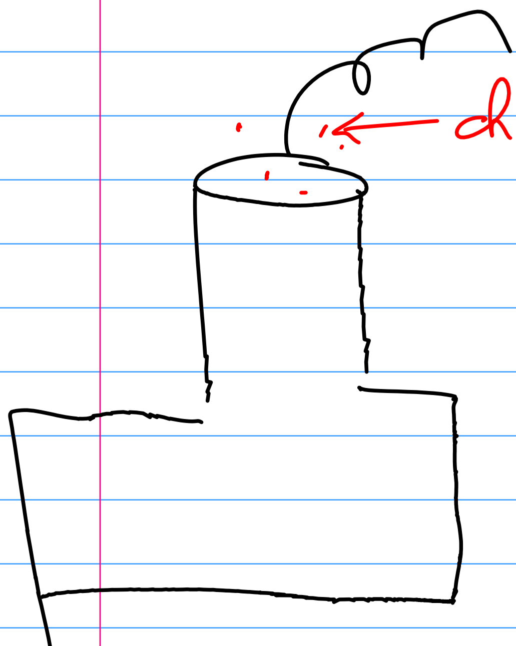
$$\vec{E} = \int_0^L \frac{\lambda\, dx'}{4\pi\epsilon_0} \left[\frac{x\hat{x} + y\hat{y} + z\hat{z}}{\left[x^2 + y^2 + z^2\right]}\right]^{3/2}$$

$$= \int_0^L \frac{\lambda dx}{4\pi\epsilon_0} \frac{\vec{r}}{|\vec{r}|} \frac{1}{r^2} = \frac{1}{4\pi\epsilon_0} Q_{tot} \frac{\hat{r}}{r^2}$$

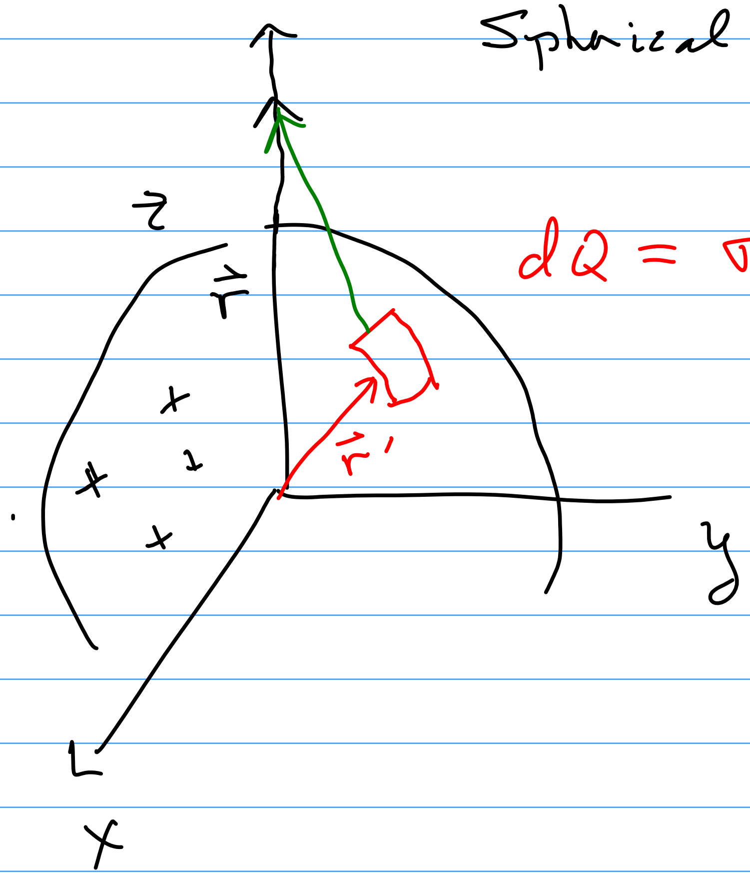
email questions → practice professional writing
→ writing to learn

http://wac.colostate.edu/intro/pop2d.cfm

http://en.wikipedia.org/wiki/Writing_Across_the_Curriculum

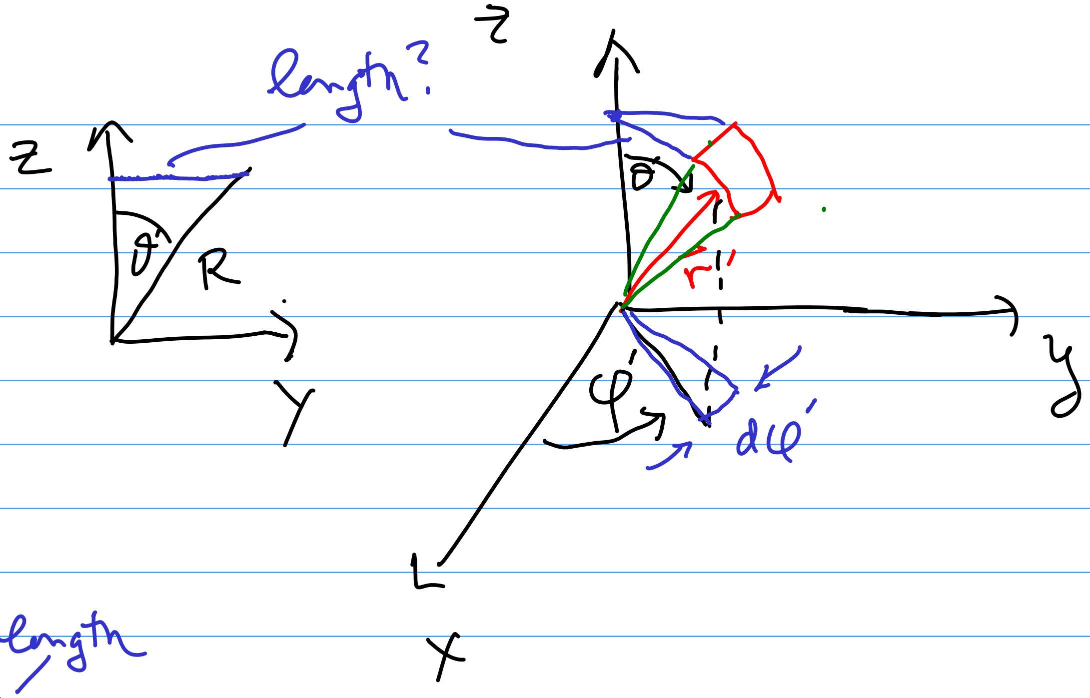


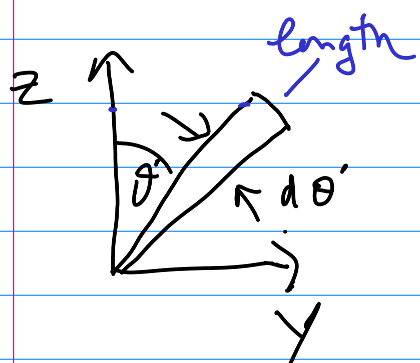
Spherical shell charged uniformly

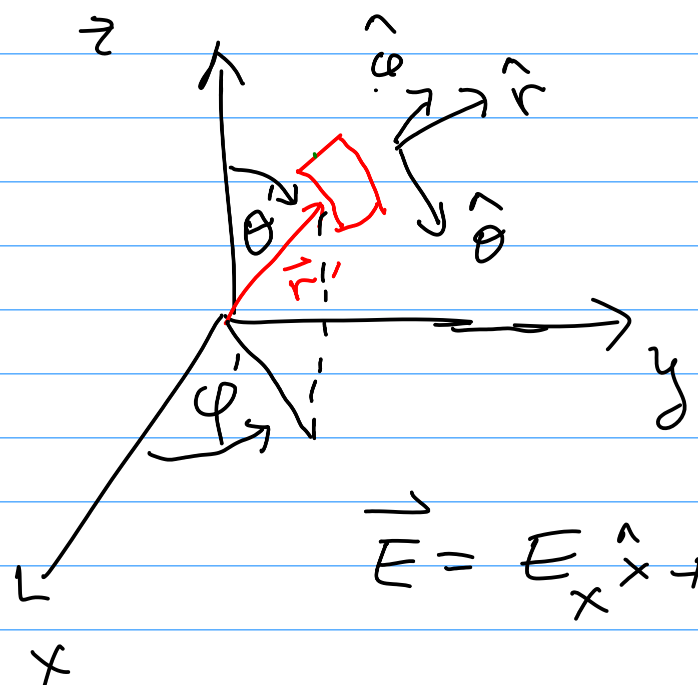


Coulombs/m^2

$dQ = \sigma \, da'$



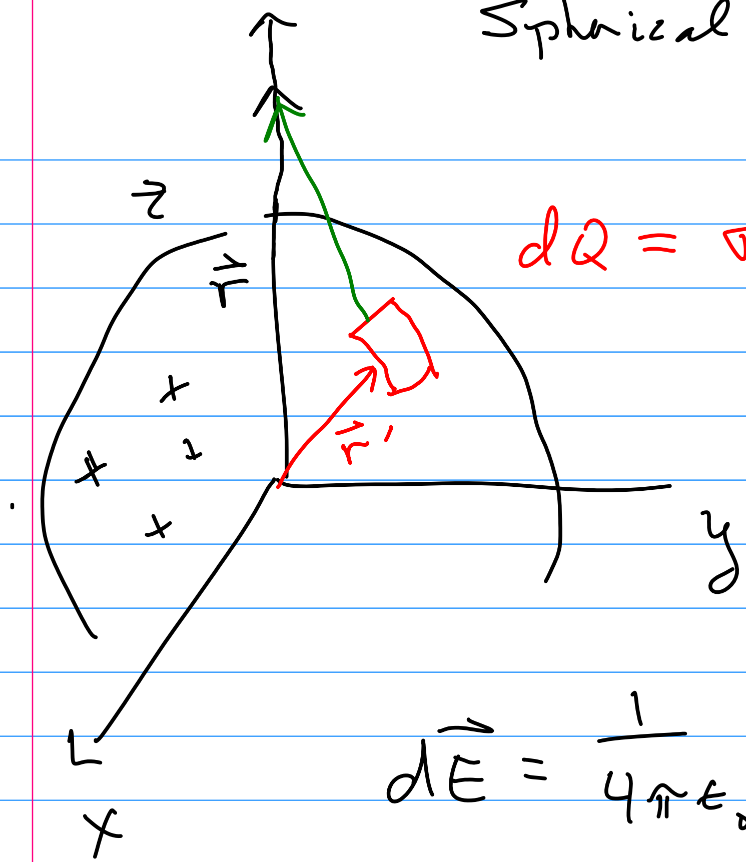




$$\vec{E} = E_x \hat{x} + E_y \hat{y} + E_z \hat{z}$$

$$= E_r \hat{r} + E_\theta \hat{\theta} + E_\varphi \hat{\varphi}$$

Spherical shell charged uniformly

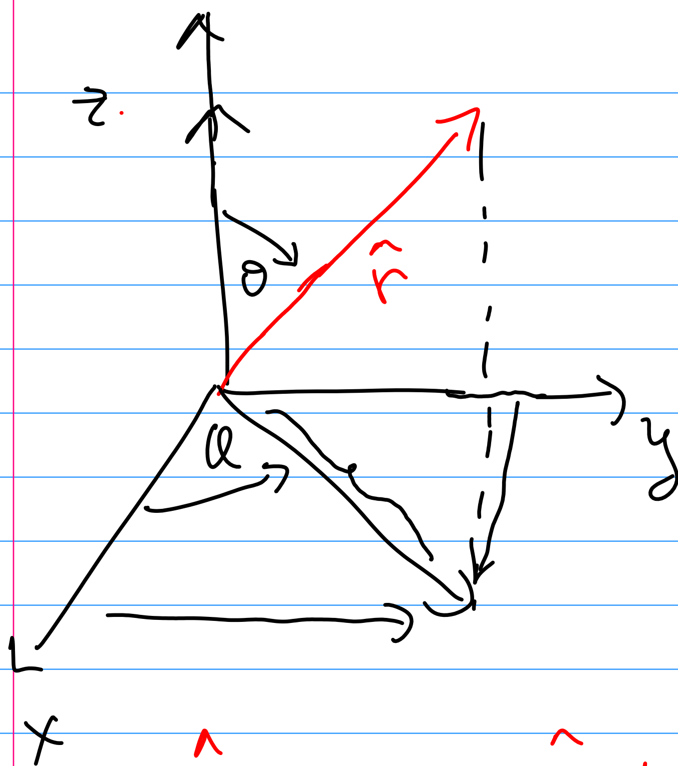


Coulombs/m^2

$$dQ = \sigma\, da'$$

$$d\vec{E} = \frac{1}{4\pi\epsilon_0}\,\frac{?\, d\theta' d\varphi'}{|r'\hat{r} - z\hat{z}|^2}\,\overbrace{\frac{(r'\hat{r} - z\hat{z})}{|r'\hat{r} - z\hat{z}|}}^{\hat{\mathscr{r}}}$$

Questions:



$$\hat{r} = \underline{\qquad\qquad}\,\hat{x} + \underline{\qquad\qquad}\,\hat{y} + \underline{\qquad\qquad}\,\hat{z}$$