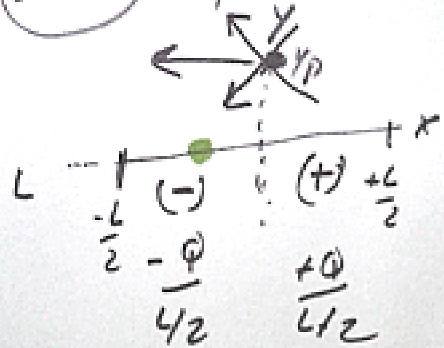
352 f17

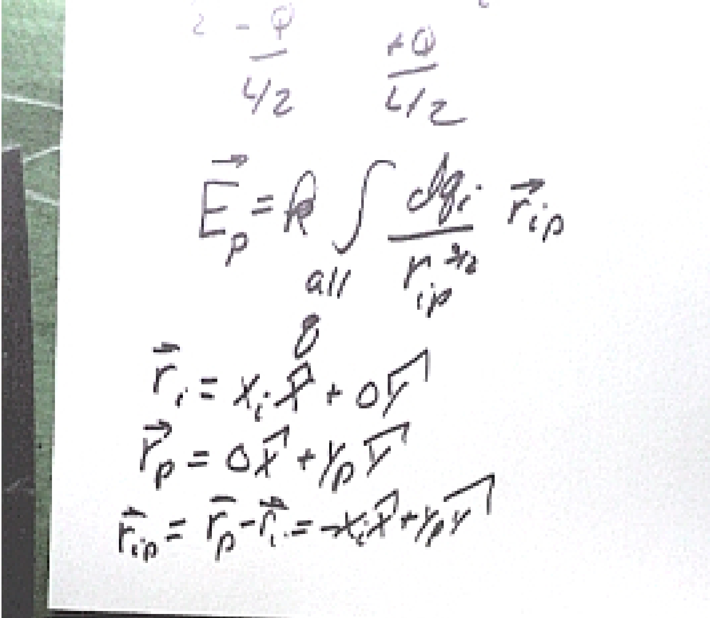


$$\vec{E}_p = k \int_{all} \frac{dq_i}{r_{ip}^{3/2}} \cdot \vec{r}_{ip}$$

$$\vec{r}_i = x_i \cdot \overset{0}{\hat{x}} + 0\hat{y}$$

$$\vec{r}_p = 0\hat{x} + y_p\hat{y}$$

$$\vec{r}_{ip} = \vec{r}_p - \vec{r}_i = -x_i\hat{x} + y_p\hat{y}$$



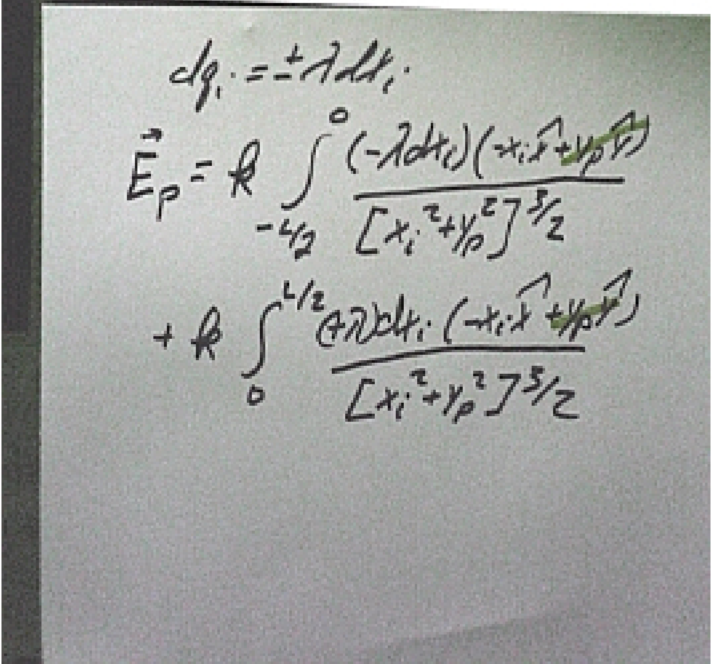
$-Q$ / $L/2$ $\quad$ $+Q$ / $L/2$

$$\vec{E}_p = k\int_{all} \frac{dq_i}{r_{ip}^{3/2}}\,\vec{r}_{ip}$$

$$\vec{r}_i = x_i\hat{x} + 0\hat{y}$$

$$\vec{r}_p = 0\hat{x} + y_p\hat{y}$$

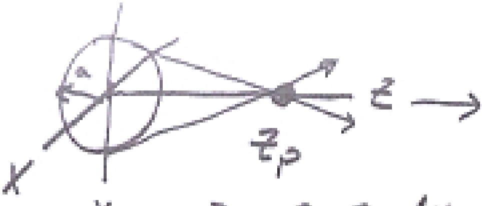
$$\vec{r}_{ip} = \vec{r}_p - \vec{r}_i = -x_i\hat{x} + y_p\hat{y}$$



$$dq_i = \pm\lambda\, dx_i$$

$$\vec{E}_p = k\int_{-L/2}^{0} \frac{(-\lambda\, dx_i)(-x_i\hat{x} + y_p\hat{y})}{[x_i^2 + y_p^2]^{3/2}}$$

$$+\, k\int_{0}^{L/2} \frac{(+\lambda\, dx_i)(-x_i\hat{x} + y_p\hat{y})}{[x_i^2 + y_p^2]^{3/2}}$$



σ y

ϕ

$$\vec{E}_p = k \int \frac{dq_i \, \hat{r}_{ip}}{r_{ip}^2}$$

$$\vec{r}_i = x_i \hat{x} + y_i \hat{y}$$

$$\vec{r}_p = z_p \hat{z}$$

$x = s \cos\phi$

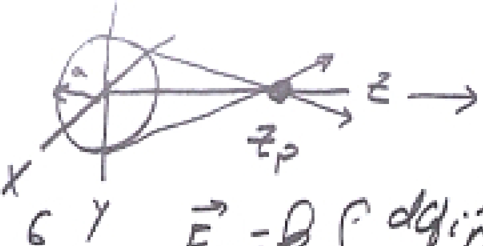
$y = s \sin\phi$

$$\vec{r}_{ip} = -x_i \hat{x} - y_i \hat{y} + z_p \hat{z}$$

$$dq_i = \sigma \, s_i \, ds_i \, d\phi_i$$

$$\vec{E} = k \int_0^{2\pi} d\phi_i \int_{s=0}^{s=a} s_i \, ds_i \, \frac{\sigma \, \cancel{s_i \, ds_i \, d\phi_i}}{\left[s^2 + z_p^2 \right]^{3/2}} \bullet$$

$$\bullet \left(-s_i \cos\phi_i \, \hat{x} - s_i \sin\phi_i \, \hat{y} + z_p \hat{z} \right)$$



σ

φ

$$\vec{E}_p = k\int \frac{dq_i}{r_{ip}^2}\hat{r}_{ip}$$

$$\vec{r}_i = x_i\hat{x} + y_i\hat{y}$$

$$\vec{r}_p = z_p\hat{z}$$

x = s cos φ
y = s sin φ

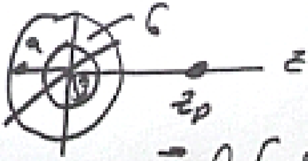
$$\vec{r}_{ip} = -x_i\hat{x} - y_i\hat{y} + z_p\hat{z}$$

$$dq_i = \sigma\, s_i\, ds_i\, d\phi_i$$

$$\vec{E} = k\int_0^{2\pi} d\phi_i \int_{s=0}^{s=a} s_i\, ds_i\, \frac{\sigma\ \text{[illegible]}}{[s^2+z_p^2]^{3/2}}$$

$$(-s_i\cos\phi_i\,\hat{x} - s_i\sin\phi_i\,\hat{y} + z_p\hat{z})$$

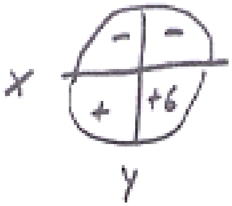
$$\vec{E} = k\cdot 2\pi z_p\,\sigma\hat{z}\int_{s=0}^{a} s\,ds\,\frac{1}{[s^2+z_p^2]^{3/2}}$$

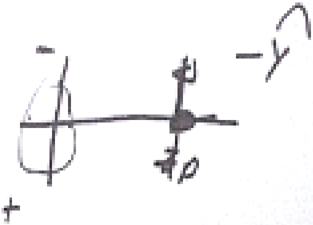


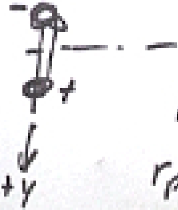
$$\vec{E}_p = k \int \frac{dq_i}{r_{ip}^{3/2}} \vec{r}_{ip}$$

$$\vec{E} = k \cdot 2\pi z_p \sigma \hat{z} \times$$

$$\times \int_{s=b}^{s=a} \frac{s\,ds}{[s^2 + z_p^2]^{3/2}}$$







$$r_i = +x_i\hat{x} + y_i\hat{y} + 0\hat{z}$$

$$r_p = z_p\hat{z}$$

~~$\vec{E} = k z_p \sigma \hat{y} \int_{\phi=0}^{\phi=\pi}$~~

$$\bar{r}_{ip} = -x_i\hat{x} - y_i\hat{y} + z_p\hat{z}$$

$\cancel{\bar{E} = k z_p \sigma \hat{} \int}$

$$\phi = 0$$

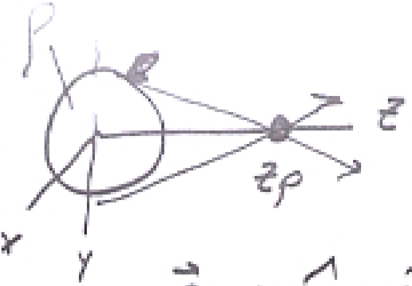
$$\bar{r}_{ip} = -x_i \hat{x} - y_i \hat{y} + z_p \hat{z}$$

$\cancel{\bar{E} = k z_p \sigma}$

$$\bar{E} = k \sigma \int_0^a s\,ds \int_{\phi=0}^{\pi} (+) \frac{\cancel{-x_i \hat{x}} - y_p \hat{y} + \cancel{z_p \hat{z}}}{\left[s^2 + z_p^2\right]^{3/2}} +$$

$$+ k \sigma \int_0^a s\,ds \int_{\phi=\pi}^{\phi=2\pi} (-) \frac{\cancel{-x_i \hat{x}} - y_i \hat{y} + \cancel{z_p \hat{z}}}{\left[s^2 + z_p^2\right]^{3/2}}$$

$$y_i = s \sin\phi$$

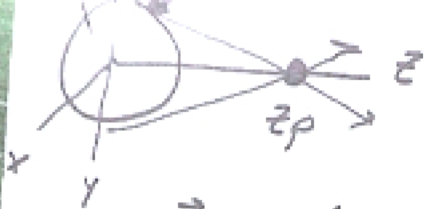


$$\vec{r}_i = x_i \cdot \hat{x} + y_i \cdot \hat{y} + z_i \cdot \hat{z}$$

$$\vec{r}_p = z_p \hat{z}$$

$$\vec{r}_{ip} = -x_i \cdot \hat{x} - y_i \cdot \hat{y} + \text{[redacted]} \; (z_p - z_i)\hat{z}$$

$$dq_i = \rho \cdot r^2 \sin\theta d\theta d\phi dr$$



$$\vec{r}_i = x_i\hat{x} + y_i\hat{y} + z_i\hat{z}$$

$$\vec{r}_p = z_p\hat{z}$$

$$\vec{r}_{ip} = -x_i\hat{x} - y_i\hat{y} + (z_p - z_i)\hat{z}$$

$$dq_i = \rho \cdot r^2 \sin\theta \, d\theta \, d\phi \, dr$$

$$\vec{E} = k\rho \int_{\phi=0}^{2\pi}$$

$$dq_i = \rho \cdot r^2 \sin\theta \, d\theta \, d\phi \, dr$$

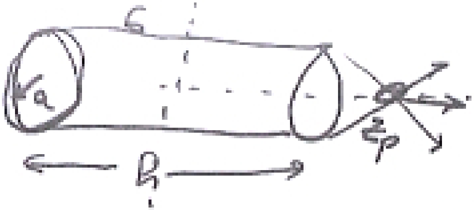
$$E = k\rho \int_{\phi=0}^{2\pi} \int_{\theta=0}^{\pi} \int_{r=0}^{a} \frac{r^2 \sin\theta \, d\theta \, d\phi \, dr \, (z_p - z_i)\hat{z}}{\left[r^2 - 2z_p z_i + z_p^2\right]^{3/2}}$$

$$+x_i^2 + y_i^2 + (z_p^2 - 2z_p z_i + z_i^2$$

$$| \quad | \quad r^2$$

$$= k\rho \cdot 2\pi \int_{\theta=0}^{\pi} \sin\theta \, d\theta \int_{r=0}^{a} r^2 \, dr \times$$

$$\times \frac{(z_p - r\cos\theta)\hat{z}}{\left[r^2 - 2z_p(r\cos\theta)\right]^{3/2}}$$



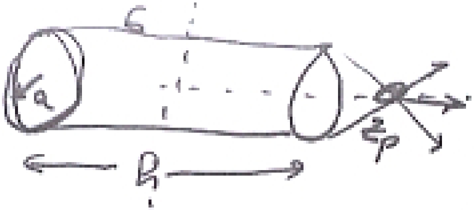
$$d f_i : a \cdot d\phi_i \cdot dz_i$$

$$\vec{r}_i = x_i \hat{x}_i + y_i \hat{y}_i + z_i \hat{z}$$

$$\vec{r}_p = z_p \hat{z}$$

$$\vec{r}_{ip} = -x_i \hat{x} - y_i \hat{y} + (z_p - z_i) \hat{z}$$

$$\vec{E}_p = k\sigma \int_{\phi=0}^{2\pi} d\phi_i \int_{z_i=-\frac{h}{2}}^{+h/2} \frac{(z_p - z_i)\hat{z} \; dz_i}{\left[a^2 + (z_p - z_i)^2\right]^{3/2}}$$



$$d f_i : a \cdot d\phi_i \cdot dz_i$$

$$\vec{r}_i = x_i \hat{x}_i + y_i \hat{y}_i + z_i \hat{z}$$

$$\vec{r}_p = z_p \hat{z}$$

$$\vec{r}_{ip} = -x_i \hat{x} - y_i \hat{y} + (z_p - z_i)\hat{z}$$

$$\vec{E}_p = k\sigma \int_{\phi=0}^{2\pi} d\phi_i \int_{z_i=-h/2}^{+h/2} \frac{(z_p - z_i)\hat{z} \; dz_i}{\left[a^2 + (z_p - z_i)^2\right]^{3/2}}$$