Solution Practice Quiz 2 PHY2049C

To → initial teachers So → initial students

(1)

$$\frac{T_0}{S_0} = \frac{2}{25}$$

$$\frac{T_0 - 2}{S_0} = \frac{3}{50}$$

$$\frac{S_0 \frac{2}{25} - 2}{S_0} = \frac{3}{50}$$

$$\frac{2}{25} - \frac{2}{S_0} = \frac{3}{50} \rightarrow \left(\frac{3}{50} - \frac{2}{20}\right)^{-1}(-2) = S_0$$

$$S_0 = 100$$

For Problem 4.

Since $\vec{F} = q\vec{E}$ for a point, then, $d\vec{F} = dq\vec{E}$ & you integrate over the body that is being affected by the field $\vec{E}$

(2)

Field due to a disk: $\vec{E} = \frac{\sigma}{2\varepsilon_0}\left(1 - \frac{z}{(z^2+R^2)^{1/2}}\right)$

For full disk:

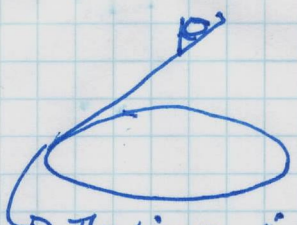
For annulus:

$$\vec{E} = \frac{\sigma}{2\varepsilon_0}\left(\frac{z}{(z^2+R_1^2)^{1/2}} - \frac{z}{(z^2+R_2^2)^{1/2}}\right)$$

$$\sigma = \frac{Q}{A} = \frac{Q}{\pi R^2} \rightarrow \text{Smaller radius bigger } \sigma.$$

$$\sigma = \frac{Q}{\pi(R_2^2 - R_1^2)}$$

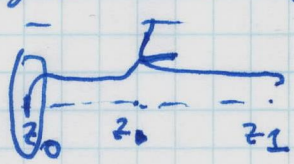
So $a > b > c$.



The bigger this angle the more the field cancels out with diametrically opposite side.

(3)

Field goes to the right.



q_1 increases
q_2 decreases
q_3 increases
R stays the same

(4) $\int d\vec{F} = \int_{z_0}^{z_1} dq\,\vec{E}_{disk}$ for an extended body.

$z_1 - z_0 = L$, $z_0 = 0$

$$\vec{E}_{disk} = \frac{\sigma}{2\varepsilon_0}\left(1 - \frac{z}{(z^2+R^2)^{1/2}}\right);$$

$$F = \int_0^{L} \frac{\sigma}{2\varepsilon_0}\left(1 - \frac{z}{(z^2+R^2)^{1/2}}\right)2\pi z\,dz =$$

$$\frac{\sigma\pi}{2\varepsilon_0}\left[(L+R)^2 - (L^2+R^2)^{1/2}\right]$$