PART 1 SUMMARY

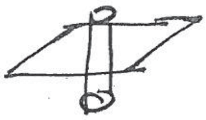
- $\vec{F} = \dfrac{Q_1 Q_2}{4\pi\epsilon_0 r^2}\,\hat{\underline{r}}$ $\qquad \vec{F}_{TOT} = \sum_i \vec{F}_i$

- $\vec{E} = \vec{F}/q$

- $\phi = -\int_{\infty}^{r} \vec{E}\cdot d\vec{l}$ $\qquad \phi_{TOT} = \sum_i \phi_i$ $\qquad \Delta U = q\Delta\phi$

- $\int_{\text{closed surface}} \vec{E}\cdot d\vec{A} = \dfrac{Q_{enc}}{\epsilon_0}$

$\vec{E} = q/4\pi\epsilon_0 r^2\,\hat{\underline{r}}$



$\vec{E} = \rho/2\epsilon_0\,\hat{\underline{z}}$

$\vec{E} = \dfrac{\rho}{2\pi\epsilon_0 r}\,\hat{\underline{r}}$

Symm: E const & ⊥ on Gaussian surface

- $V = Q/C$ $\qquad$ // $C_{TOT} = \sum_i C_i$ $\qquad$ series $\dfrac{1}{C_{TOT}} = \sum_i \dfrac{1}{C_i}$

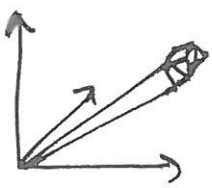
$W = \int V\,dq = \frac{1}{2}CV^2$

INFINITESSIMAL ELEMENTS

$dx\ \left(\int_0^L\right)$

$r\,dr\,d\theta$

$\left(\int_0^{2\pi}\int_0^{a}\right)$



$r^2 \sin\theta\, d\theta\, d\phi\, dr$

$\left(\int_0^{\pi}\int_0^{2\pi}\int_0^{a}\right)$

Part II

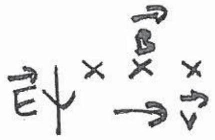
$$\int_{\text{closed surface}} \vec{B}\cdot d\vec{A} = 0$$

$\vec{B}$ is like $\vec{E}$ but no monopoles

$$\vec{F} = q\,\vec{v}\times\vec{B}$$

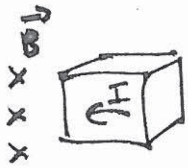
$$\frac{mv^2}{r} = qvB \qquad T = \frac{2\pi m}{qB}$$

$$\vec{F} = q(\vec{E} + \vec{v}\times\vec{B})$$



$$qvB = qE.$$

Hall Effect:



$$E_H = Bv \qquad V_H = \frac{BI}{net}$$

nAve

Wires in $\vec{B}$ $\quad \vec{F} = I(\vec{l}\times\vec{B})$

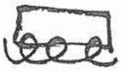
$$d\vec{B} = \frac{\mu_0}{4\pi}\frac{1}{r^2} I\, d\vec{l}\times\hat{r}$$

|| like attract, opposite repel

$$\oint \vec{B}\cdot d\vec{l} = \mu_0 I$$

$$\vec{B} = \frac{\mu_0 I}{2\pi r}\hat{\theta}$$

$$\vec{B} = \frac{\mu_0 I}{2\pi r}\frac{\pi r^2}{\pi a^2}\hat{\theta}$$



$$Bl = N\mu_0 I.$$

$$\text{EMF} = \int -\frac{d\Phi_B}{dt} \qquad \Phi_B = \int \vec{B}\cdot d\vec{A}$$

Lenz's law EMF_I in direction to oppose change

effective

$$\int \vec{B}\cdot d\vec{l} = \mu_0 I + \mu_0\epsilon_0 \frac{d\int \vec{E}\cdot d\vec{A}}{dt}$$

effective current