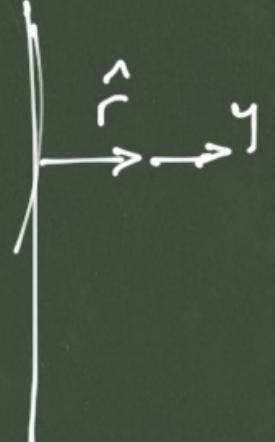



FILO $\vec{E} = \hat{r} \frac{2k_e \lambda}{r}$

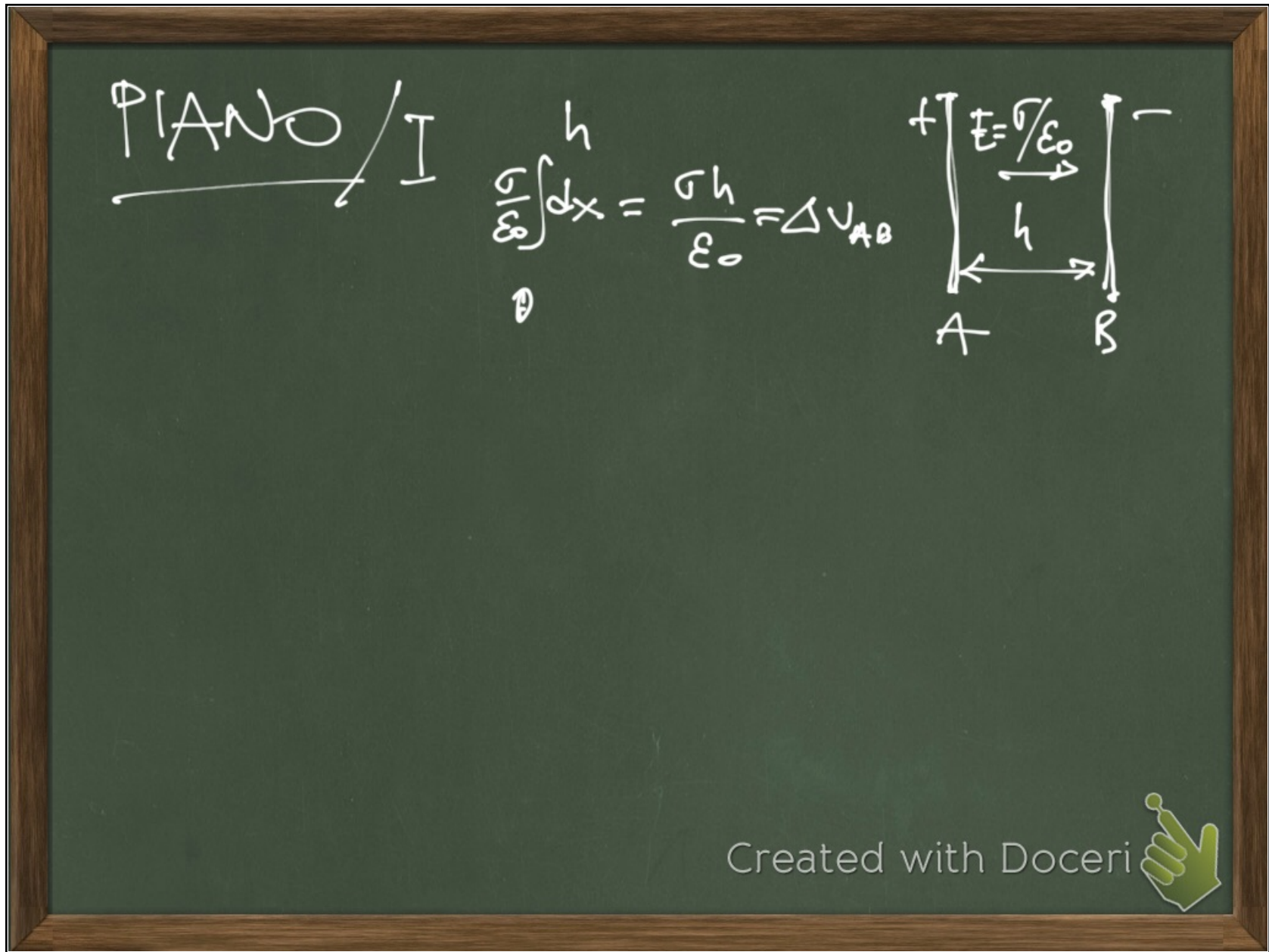


$V_1 - V_2 = \int_{y_1}^{y_2} \frac{2k_e \lambda}{y} dy = 2k_e \lambda \ln y \Big|_{y_1}^{y_2}$

$= 2k_e \lambda \ln \left(\frac{y_2}{y_1} \right)$

$V = k_e \lambda \ln \left(\frac{L + \sqrt{L^2 + y^2}}{-L + \sqrt{L^2 + y^2}} \right)$

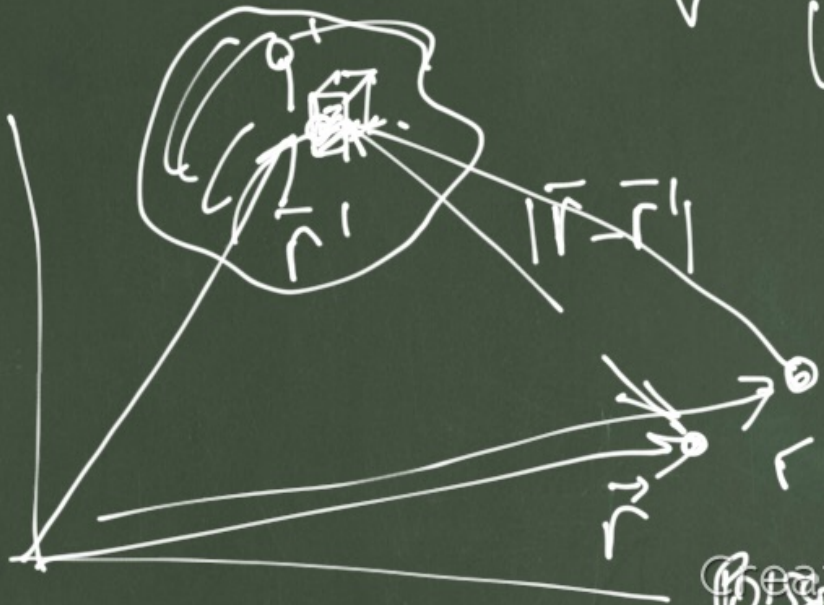
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$$dV(\vec{r}) = k_e \frac{dq'}{|\vec{r} - \vec{r}'|} = k_e \frac{\rho'(\vec{r}') d\vec{r}'}{|\vec{r} - \vec{r}'|}$$


$$\int dV = V(\vec{r}) = k_e \int \frac{\rho'(\vec{r}') d\vec{r}'}{|\vec{r} - \vec{r}'|}$$

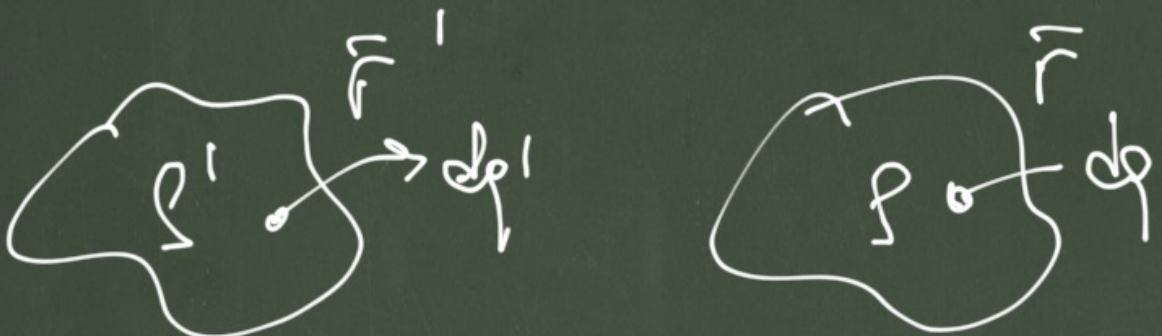


$$\text{div } \vec{E} = \rho / \epsilon_0$$

$$\text{div grad } V = \rho$$


$$\frac{\partial^2 V}{\partial x^2} = -\rho$$

Poisson 

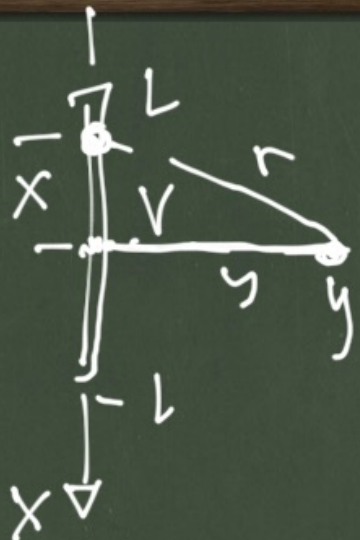


$$dU = \frac{dq' dq}{|\vec{r} - \vec{r}'|} = \frac{\rho'(\vec{r}') d\vec{r}' \rho(\vec{r}) d\vec{r}}{|\vec{r} - \vec{r}'|}$$

$$U = \iint d\vec{r}' d\vec{r} \frac{\rho' \rho}{|\vec{r} - \vec{r}'|} \quad \text{Numero}$$


~~the~~ Hartree 

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$$V = k_e \lambda \int \frac{dx}{(x^2 + y^2)^{1/2}}$$

$$= k_e \lambda \ln \left[\frac{L + (L^2 + y^2)^{1/2}}{-L + (L^2 + y^2)^{1/2}} \right]$$

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DIPOLLO $\vec{p} = q\vec{d}$

$$V = k_e q \left[\frac{1}{r_p} - \frac{1}{r_n} \right]$$

$$= k_e q \left[\frac{r_n - r_p}{r_p r_n} \right]$$

$r_n, r_p \gg d$ | $\sim k_e q \frac{d \cos \vartheta}{r^2}$

$$= k_e q \frac{\vec{d} \cdot \vec{r}}{r^3} = \boxed{k_e \frac{\vec{p} \cdot \vec{r}}{r^3}}$$

$r_n, r_p \sim r^2$
 $\rightarrow r_n - r_p \sim d \cos \vartheta$

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The diagram illustrates the interaction between a magnetic field and a current-carrying loop. On the left, a vertical line with tick marks represents a wire. On the right, a vertical line with tick marks and a circled 'X' at the bottom represents another wire. Two horizontal arrows point to the left, representing a uniform magnetic field \vec{B} . In the center, a current loop is shown with a '+' sign at the top and a '-' sign at the bottom. An arrow indicates the direction of current flow. Below the loop, a magnetic dipole moment \vec{M} is shown pointing to the right. To the right of the loop, a circular arrow indicates the direction of rotation $\vec{\omega}$. At the bottom center, the equation $\vec{M} = \vec{p} \times \vec{E}$ is written. A green hand icon is in the bottom right corner.

$$\vec{M} = \vec{p} \times \vec{E}$$

$\odot \hat{z}$
 $\otimes \hat{z}$

\odot in fuori
 \otimes in dentro

$\vec{M} = \tau p \sin \vartheta \hat{z}$

$M = \frac{\partial U}{\partial \vartheta}$

$U = -\vec{p} \cdot \vec{E}$

$U = \int_0^{\vartheta} M d\vartheta' = \tau p \int_0^{\vartheta} \sin \vartheta' d\vartheta'$
 $= (1 - \cos \vartheta) \tau p$
 $= \tau p - \tau p \cos \vartheta$

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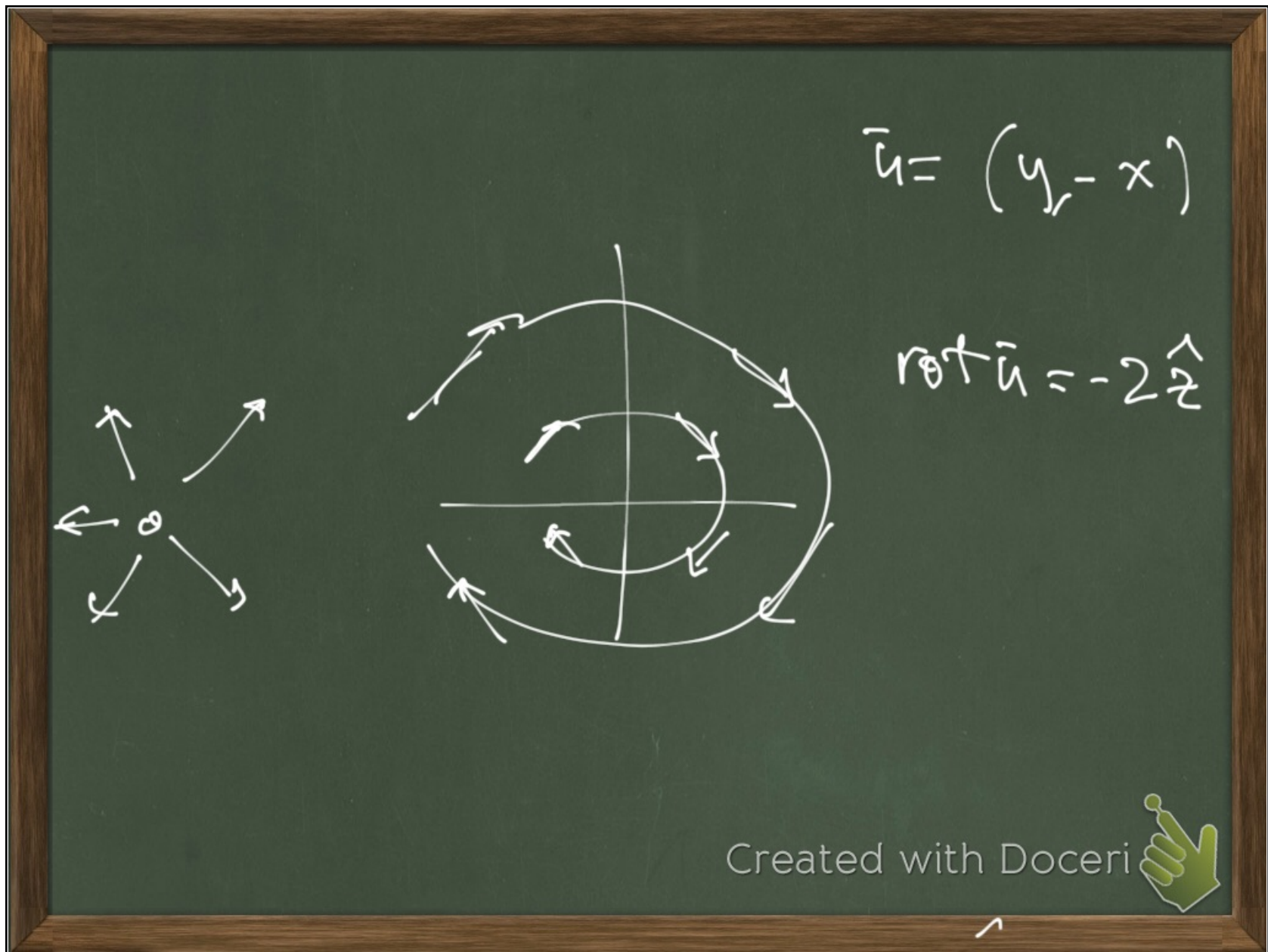
$$\oint_L \vec{E} \cdot d\vec{s} = 0$$

$$\oint_S \text{rot } \vec{B} \cdot d\vec{A} = \oint_L \vec{B} \cdot d\vec{l}$$



\hat{x}	\hat{y}	\hat{z}
$\frac{\partial}{\partial x}$	$\frac{\partial}{\partial y}$	$\frac{\partial}{\partial z}$
E_x	E_y	E_z

$$= \hat{x} \left(\frac{\partial E_z}{\partial y} - \frac{\partial E_y}{\partial z} \right) + \dots$$




$$\oint_S \text{rot } \vec{E} \cdot \vec{A} = \oint \vec{E} \cdot d\vec{s}$$

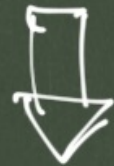
$$\boxed{\text{rot } \vec{E} = 0}$$

$$\int \vec{E} \cdot d\vec{s} = 0$$

II
 Maxwell

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