SUMMARY FOR TEST2

δ-function

Electrostatics:

Coulomb's law $\vec{F} = \frac{1}{4\pi\varepsilon_0}\frac{qQ}{\mathcal{R}^2}\hat{\mathcal{R}}$ $\qquad \vec{F} = q\vec{E}$

Electric Field $\vec{E} = \frac{1}{4\pi\varepsilon_0}\sum\frac{q_i}{\mathcal{R}_i^2}\hat{\mathcal{R}}_i$

$$\vec{E}(\vec{r}) = \frac{1}{4\pi\varepsilon_0}\int\frac{dq}{\mathcal{R}^2}\hat{\mathcal{R}}$$

Gauss's Law $\oint\vec{E}\cdot d\vec{a} = \frac{Q_{enc}}{\varepsilon_0}$ $\qquad \vec{\nabla}\cdot\vec{E} = \frac{\rho}{\varepsilon_0}$

& applications

$$V(\vec{r}) = -\int_{\infty}^{\vec{r}}\vec{E}\cdot d\vec{l}'$$

$$V(\vec{r}) = \frac{1}{4\pi\varepsilon_0}\int\frac{dq}{\mathcal{R}} \qquad \text{and } \vec{E} = -\vec{\nabla}V$$

$$W = \frac{1}{2}\int_{\mathcal{V}}\rho(r)V(r) = \frac{\varepsilon_0}{2}\int_{\text{all space}}E^2\,d\tau$$

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next test: conductors & $C = \frac{Q}{\Delta V}$