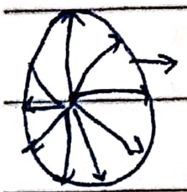
DATE Karisma.

Hukum Gauss and applied

$$\oint_s \vec{E} \cdot d\vec{a} = \int_v (\nabla \cdot \vec{E})\, d\tau$$



sur face of Gauss

$$\oint \vec{E} = \oint \frac{q}{4\pi \epsilon_0 r^2} r^2 \sin d\theta\, d\phi$$

$$= \frac{q}{4\pi\epsilon_0} \int_0^{\pi}\int_0^{2\pi} \sin d\theta\, d\phi$$

$$= \frac{4\pi q}{4\pi\epsilon_0}$$

$$\boxed{\oint_s \vec{E}\, da = \frac{q}{\epsilon_0}}$$ → persamaan Gauss dalam bentuk diferensial.

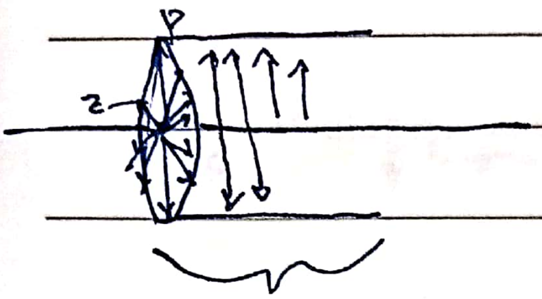
$\int_v (\nabla \vec{E})\, d\tau.$

$Q = \rho\, d\tau$

$\oint E \cdot d\vec{a} = \int_v (\nabla \cdot E)\, d\tau$

$\int_v (\nabla \vec{E})\, d\tau = \frac{Q}{\epsilon_0}$

$\boxed{\nabla \cdot \vec{E} = \frac{\rho}{\varepsilon_0}}$ → Hukum Gaus dalam bentuk diferensial.



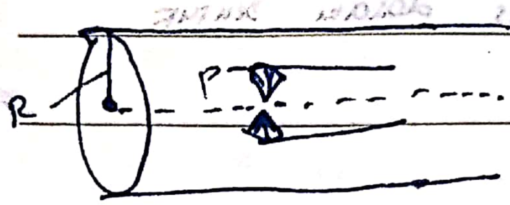
$\sigma \Rightarrow V$

$\oint E\, da = \frac{q}{\varepsilon_0}$

$E(2\pi z\, d) = \frac{\lambda \cdot l}{\varepsilon_0}$

$\vec{E} = \frac{\lambda}{2\pi \varepsilon_0 z} \quad \hat{z_0}$

Contoh:

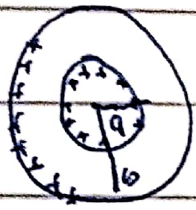


$\oint \vec{E}\, da = \frac{Q}{\varepsilon_0}$

$\vec{E}\,(2\pi r \cdot l) = \frac{Q}{\varepsilon_0}$

$\vec{E} = \frac{Q}{} \quad \hat{z_0}$

Contoh ②



calculate $\vec{E}$

~~Condition~~

① $r < a$

② $a < r < b$

③ $r > b$

① $\vec{E} = 0$

② $\oint \vec{E} \, da = \frac{Q}{\varepsilon_0}$

$\oint \vec{E} \cdot da$

$\vec{E} \cdot (4\pi r^2) = \frac{1}{\varepsilon_0} \iint_{4\pi} \int_a \rho \, d\tau .$

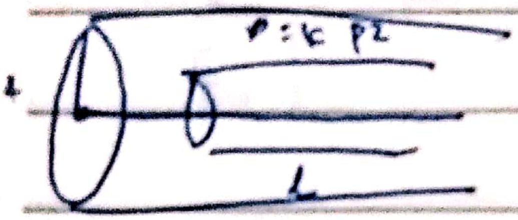
$= \frac{1}{\varepsilon_0} \int_0 \int_0 \int_0 \rho \, r^2 \sin\theta \, d\theta \, d\phi \, dr .$

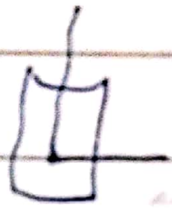
$= \frac{4\pi r}{\varepsilon_0} \int_0 r^2 \, dr .$

~~Rab~~ $= \frac{4\pi r}{\varepsilon_0} \int_0^b r^2 \, dr$

$= \frac{4\pi\rho}{\ldots} \left(\frac{1}{3} r^3 \Big|_a^b \right)$

DATE S M T W T F S





① $r < R$

② $r > R$

$$\oint \vec{E}\, da = \frac{1}{\varepsilon_0} \iiint_{2\pi\, L\, R} \rho \, d\tau$$

$$\vec{E}(2\pi r \cdot L) = \frac{1}{\varepsilon_0} \iiint_{0\,0\,0} (k r^2)\, r\, d\phi\, dz\, dr$$

$$= \frac{2\pi k}{\varepsilon_0} \int_0^L dz \int_0^R r^3 \, dr$$