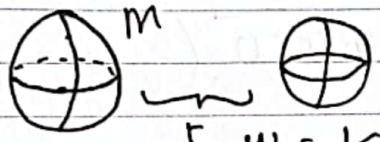
Kalkulus Pertemuan ke-8.

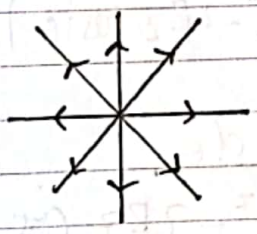
No
Date

Potensial Listrik.




$W = kc \frac{m \cdot m}{r}$

$V = \frac{W}{m} = kc \frac{m}{r}$



$W = \vec{F} \cdot \vec{r}$

$= kc \frac{q \cdot Q}{r^2} \cdot r$

$W = kc \frac{q \cdot Q}{r}$

$V_{ab} = \frac{W}{Q}$

$V = \frac{W}{Q} = kc \frac{q \cdot Q}{r}$

Muatan q digerakan oleh suatu gaya ke titik P mendekati muatan sumber.

$\int_a^b dV = \int_{r_a}^{r_b} kc \frac{q}{r^2} dr$

$= -kq \int_{r_a}^{r_b} r^{-2} dr$

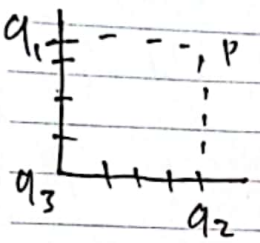
$= -kq \left(-r^{-1} \Big|_{r_a}^{r_b}\right)$

$= kq \left[\frac{1}{r_b} - \frac{1}{r_a}\right]$

$V_b - V_a = kq \left[\frac{1}{r_b} - \frac{1}{r_a}\right]$

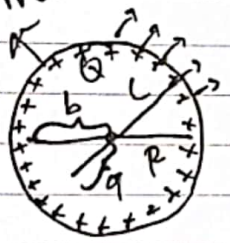
No
Date

Contoh 1




$$V_p = k\left[\frac{q_1}{\sqrt{32}} + \frac{q_2}{4} + \frac{q_3}{4}\right]$$

memiliki muatan

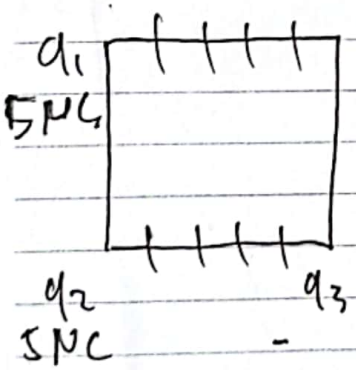



$$V_b - V_a = kq\left[\frac{1}{r_b} - \frac{1}{r_a}\right]$$

$V_b = V_a = k\frac{Q}{R}$ (energi potensial) → dalam

$V_b = V_a = k\frac{Q}{r}$ (energi potensial) → luar.

Tugas 1 : hlm 61.




$$V = k\left[\frac{q_1}{r_1} + \frac{q_2}{r_2} + \frac{q_3}{r_3}\right]$$

$$= k\left[\frac{5}{8} + \frac{5}{8} + \frac{-4}{\sqrt{128}}\right]$$

$$= k\left(\frac{5}{8} + \frac{5}{8} + \frac{-4}{11,3}\right)$$

$$= 9,10^9 \left(\frac{5}{8} + \frac{5}{8} + \frac{-4}{11,3}\right)$$



muatan terdistribusi $\lambda = Y \times q$

$$\nabla \cdot \nabla V = \nabla^2 V$$

$$\vec{E} = -\nabla V$$

$$\nabla \cdot \vec{E} = \frac{\rho}{\varepsilon_0}$$

Poisson

$$\nabla \times \vec{E} = 0$$

$$\nabla^2 V = \frac{\rho}{\varepsilon_0}$$

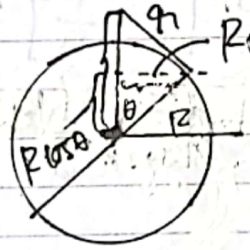
$$\nabla^2 V = 0 \rightarrow \text{Laplacian}$$

a1

$$V = k\frac{q}{r}$$

$$V = k\int \frac{\sigma\, dq}{r}$$

$$= k\int \frac{dq}{r} \rightarrow \sigma.q$$




$$q = \sqrt{(r\sin\theta)^2 + (z - r\cos\theta)^2}$$

$$q = \sqrt{r^2 + z^2 - 2rz\cos\theta}$$

$$V = \frac{1}{4\pi\varepsilon_0}\int_0^{2\pi}\int_0^{\pi} \frac{\sigma\, dq}{r}$$

$$= \frac{\pi\sigma}{4\pi\sigma}\int_0^{\pi}\int_0^{\pi} \frac{r^2\sin\theta\, d\theta\, d\phi}{(r^2 + z^2 - 2rz\cos\theta)^{\frac{1}{2}}}$$

$$= \frac{2\pi\sigma}{4\pi\varepsilon_0}\int_0^{\pi} \frac{\sin\theta\, d\theta}{(r^2 + z^2 - 2rz\cos\theta)^{\frac{1}{2}}}$$

$$= \frac{2\pi\sigma}{4\pi\varepsilon_0}\int \frac{d(\cos\theta)}{(r^2 + z^2 - 2rz\cos\theta)^{\frac{1}{2}}}$$

$$= \square \int (r^2 + z^2 - 2Qz\cos\theta)^{\frac{1}{2}} d(\cos\theta)$$