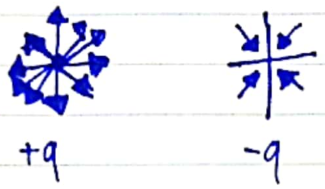
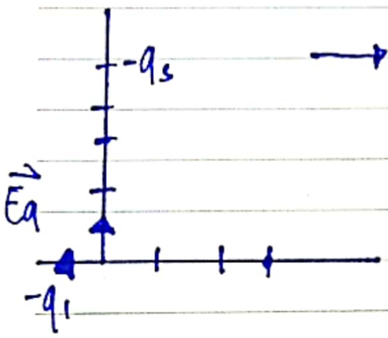
Medan Listrik ($\vec{E}$)





$\longrightarrow E_1 = \frac{\sum \vec{E}}{q_1}$

$= \frac{F_{q_3}}{q_1} + \frac{F_{q_2}}{q_1}$

$\vec{E} = k\frac{q_3}{r^2} + k\frac{q_2}{r^2}$

1. $\vec{E} = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}\hat{r}$ → tidak saling berhubungan.

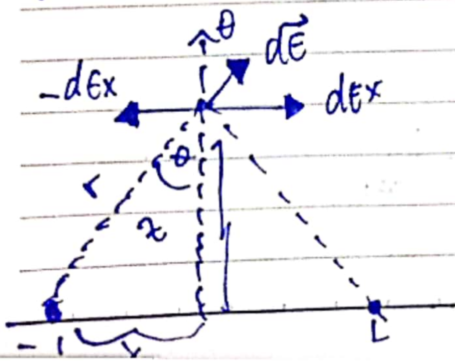
   $= k\frac{q}{r^2}\hat{r}_0$ → oleh muatan deskrit

2. $\vec{E} = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}\hat{r} \to q = \lambda l$ → muatan terdistribusi pada penggaris.

3. $\vec{E} = \frac{1}{4\pi\varepsilon_0}\iint\frac{\sigma\, dq}{r^2}\hat{r}_0$  → luas permukaan

4. $\vec{E} = \frac{1}{4\pi\varepsilon_0}\iiint\frac{\rho\, d\tau}{r^2}\hat{r}_0$

contoh



$r = (x^2 + z^2)^{\frac{1}{2}}$

$d\vec{E} = dE_y + dE_x$

$d\vec{E} = dE_y$

$dE_y = dE\cos\theta$

$$E = \frac{1}{4\pi\varepsilon_0}\int_{-l}^{l}\frac{\lambda\, dl}{r^2}\cos\theta$$

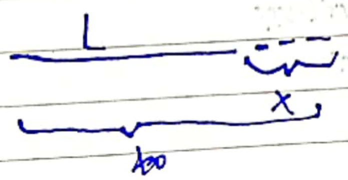
$$= \frac{2}{4\pi\varepsilon_0}\int_0^l \frac{\lambda\, dx}{(x^2+z^2)}\cos\theta$$

$$= \frac{2\lambda z}{4\pi\varepsilon_0}\boxed{\int_0^l \frac{dx}{(x^2+z^2)^{3/2}}} \quad = \frac{x}{z^2\sqrt{x^2+z^2}}$$

$$= \frac{2\lambda z}{4\pi\varepsilon_0}\left[\frac{dx}{(x^2+z^2)^{3/2}}\right]\Big|_0^L$$

$$= \frac{2\lambda z}{4\pi\varepsilon_0}\left[\frac{l}{z^2\sqrt{l^2+z^2}} - \frac{0}{z^2\sqrt{0+z^2}}\right]$$

$$= \frac{2\lambda z}{4\pi\varepsilon_0}\left[\frac{l}{z^2\sqrt{l^2+z^2}}\right]$$



$$\vec{E} = \frac{1}{4\pi\varepsilon_0}\lambda\int_0^L\frac{x\,dx}{(x_0-x)^2}$$

$$\vec{E} = \frac{1}{4\pi\varepsilon_0}\lambda\int_0^L (x_0-x)^{-2}\,dx$$

$$= \frac{1}{4\pi\varepsilon_0}\lambda\left[(x_0-x)^{-1}\Big|_0^l\right]$$

$$= \frac{1}{4\pi\varepsilon_0}\lambda\left[\left(\frac{1}{x_0-x}\right)\Big|_0^l\right]$$

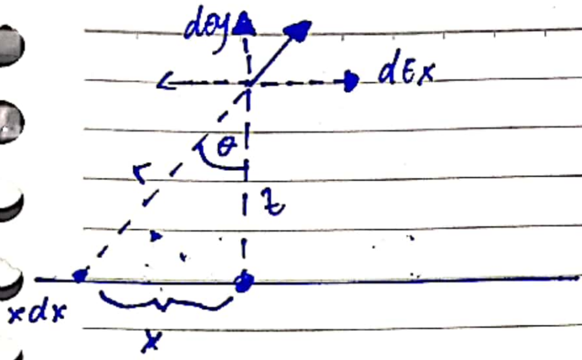
$$= \frac{1}{4\pi\varepsilon_0}\lambda\left[\frac{1}{(x_0-l)} - \frac{1}{(x_0-0)}\right] \quad \frac{1}{(x_0-l)} \leftrightarrow \frac{1}{(x_0-0)}$$

dikali

$$= \frac{1}{4\pi\varepsilon_0}\lambda\left[\frac{x_0-(x_0-l)}{x_0(x_0-l)}\right]$$

No.

Date



$\vec{E} = \vec{E_x} + \vec{E_y}$

$\vec{E} = \frac{1}{4\pi\varepsilon_0}\int_{-\infty}^{\infty} \frac{\lambda dx}{r^2} \cos\theta$

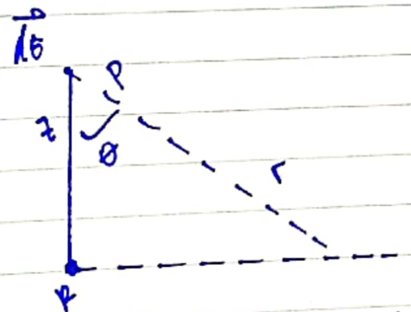
$\cos\theta = \frac{z}{s} \rightarrow y = \frac{z}{\cos\theta}$

$\text{tangen } \theta = \frac{x}{z} = x = z \text{ tangen } \theta$

$dx = \frac{a}{\cos^2\theta} \rightarrow x^2 = -\infty$

$\theta = -\pi/2$

$x = \infty \rightarrow \theta = \frac{\pi}{2}$



$\vec{E} = \frac{1}{4\pi\varepsilon_0}\int_0^{2\pi R} \frac{z\lambda dl}{(z^2+R^2)^{3/2}}$

$= \frac{z\lambda}{4\pi\varepsilon_0(z^2+R^2)^{3/2}}\int_0^{2\pi R} dl$

$= \frac{z\lambda}{4\pi\varepsilon_0(z^2+R^2)^{3/2}} ((l)\Big|_0^{2\pi R}$

$(2\pi R)$

$= \frac{z\pi}{4\pi R\varepsilon_0(z^2+R^2)^{3/2}}$