

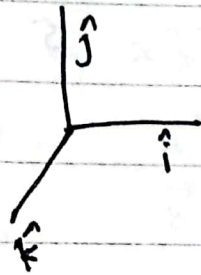
Kelistrikan dan Kemagnetan

Pertemuan ke - 1

"Role of Mathematic in Physics."

$$\vec{r} = x_1 \hat{i} + x_2 \hat{j} + x_3 \hat{k}$$

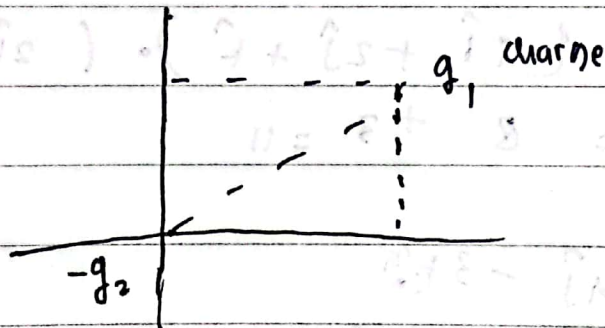
$$\vec{v} = v_1 \hat{i} + v_2 \hat{j} + v_3 \hat{k}$$



$$\hat{p} = \frac{\vec{p}}{|\vec{p}|} = \frac{x_1 \hat{i} + y_1 \hat{j} + z_1 \hat{k}}{\sqrt{x^2 + y^2 + z^2}}$$

$$\vec{p} = x_1 \hat{i} + y_1 \hat{j} + z_1 \hat{k}$$

Example =



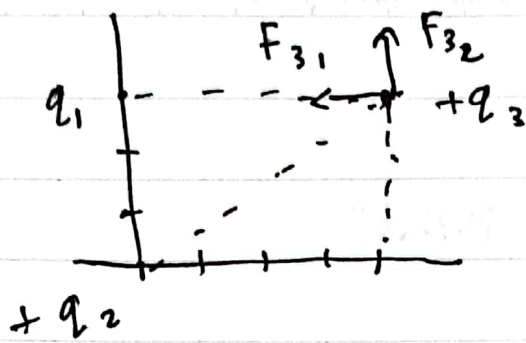
Pada q_1

$$\vec{F}_g = \frac{k q_1 q_2}{r^2} \hat{r}$$

$$= \frac{k q_1 q_2}{\sqrt{3^2 + 1^2}} \left(\frac{-4\hat{i} - 3\hat{j}}{5} \right)$$

Pada q_2

$$\vec{F}_g = \frac{k q_1 q_2}{r^2} \hat{r} = \frac{k q_1 q_2}{5^2} \left(\frac{4\hat{i} + 3\hat{j}}{5} \right)$$



$$\hat{p} = \frac{-4\hat{i} + 0 + 0}{\sqrt{4^2 + 0^2 + 0^2}} = -\hat{i}$$

$$F_{23} = F_{31} + F_{32}$$

$$= kq_3 \left[\frac{q_1(-1)}{4^2} + \frac{q_2}{5^2} (4\hat{i} + 3\hat{j}) \right]$$

$\hat{p} = \frac{\vec{p}}{|\vec{p}|}$

↓

|p|

$$\vec{v}_1 = 4\hat{i} + 2\hat{j} + \hat{k}$$

$$\vec{v}_2 = 2\hat{i} + 3\hat{k}$$

$$\vec{v}_1 \cdot \vec{v}_2 = (4\hat{i} + 2\hat{j} + \hat{k}) \cdot (2\hat{i} + 3\hat{k})$$

$$= 8 + 3 = 11$$

$$\vec{a} = 3\hat{i} + 4\hat{j} - 3\hat{k}$$

$$\vec{b} = 2\hat{i} - 3\hat{j} + 2\hat{k}$$

$$\vec{a} \cdot \vec{b} = (3\hat{i} + 4\hat{j} - 3\hat{k}) \cdot (2\hat{i} - 3\hat{j} + 2\hat{k})$$

$$= 6 - 12 - 6 = -12$$

$$a \cdot 9 + 16 + 9 = 34$$

$$\vec{a} \times \vec{b} = \vec{a} = 3\hat{i} + 4\hat{j} - 3\hat{k}$$

$$\vec{b} = 2\hat{i} - 3\hat{j} + 2\hat{k}$$

$$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & 4 & -3 \\ 2 & -3 & 2 \end{vmatrix}$$

$$\vec{a} \times \vec{b} = \hat{i} \begin{vmatrix} 4 & -3 \\ -3 & 2 \end{vmatrix} + \hat{j} \begin{vmatrix} 3 & -3 \\ 2 & 2 \end{vmatrix} + \hat{k} \begin{vmatrix} 3 & 4 \\ 2 & -3 \end{vmatrix}$$

$$= 8 - (9) = -1$$

$$= 6 - (-6) = 12$$

$$= -9 - 8 = -17$$

$$\vec{a} \times \vec{b} = -\hat{i} + 12\hat{j} - 17\hat{k}$$

Example : $\vec{a} = 4\hat{i} - 5\hat{j} + \hat{k}$

$$\vec{b} = 2\hat{i} + 3\hat{j} - 2\hat{k}$$

$$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 4 & -5 & 1 \\ 2 & 3 & -2 \end{vmatrix}$$