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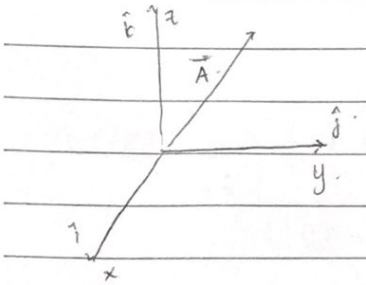
No. :

KALISMA

(Kelistrikan dan Kemagnetan).

Operasi dalam Fisika.

(1) Analisa vektor.



$\vec{A} = A$

$|\vec{A}|$

$\vec{A} = x\hat{i} + y\hat{j} + z\hat{k}$

$\hat{A} = \frac{\vec{A}}{|\vec{A}|} = \frac{x\hat{i} + y\hat{j} + z\hat{k}}{\sqrt{x^2 + y^2 + z^2}}$

$\vec{A} = x^2y\hat{i} + 3yz\hat{j} + 2xy\hat{k}$

$\vec{B} = z\hat{i} + 2yx\hat{j} + 3xz\hat{k}$

$\vec{A} + \vec{B} = (x^2y + z)\hat{i} + (3yz + 2yx)\hat{j} + (2xy + 3xz)\hat{k}$

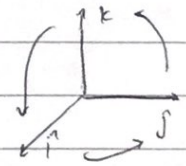
$\vec{A} \cdot \vec{B} = (x^2y\hat{i} + 3yz\hat{j} + 2xy\hat{k})(z\hat{i} + 2yx\hat{j} + 3xz\hat{k})$.

= (diralikan)

$= x^2yz + 6yzx + 5xyz$.

$\vec{A} \times \vec{B} =$

$\hat{i}$	$\hat{j}$	$\hat{k}$	$\hat{i}$	$\hat{j}$
x^2y	$3yz$	$2xy$	x^2y	$3yz$
z	$2yx$	$3xz$	z	$2yx$



$= (3yz \cdot 3xz)\hat{i} - (2xy \cdot 2yx)\hat{i} + (x^2y \cdot 2yx)\hat{k} - (3yz \cdot z)\hat{k} + (2xy \cdot z)\hat{j}$
$- (x^2y \cdot 3xz)\hat{j}$.

$= (9yxz^2 - 4x^2y^2)\hat{i} + (2x^3y^2 - 3yz^2)\hat{k} + (2xyz^2 - 3x^3yz)\hat{j}$

No. :

Operasi Nabla (∇)

$$\nabla = \hat{i}\frac{\partial}{\partial x} + \hat{j}\frac{\partial}{\partial y} + \hat{k}\frac{\partial}{\partial z}$$

gradien.

$T = x^2yz + 3y^2z$.

$$\nabla T = \hat{i}\frac{\partial(x^2yz + 3y^2z)}{\partial x} + \hat{j}\frac{\partial(x^2yz + 3y^2z)}{\partial y} + \hat{k}\frac{\partial(x^2yz + 3y^2z)}{\partial z}.$$

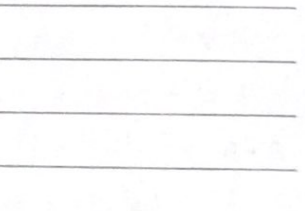
$$= (2xyz + 3y^2z)\hat{i} + (x^2z + 6yz)\hat{j} + (x^2y + 3y^2)\hat{k}$$

$$\nabla \cdot \vec{A} = \frac{\partial V}{\partial x} + \frac{\partial V}{\partial y} + \frac{\partial V}{\partial z}$$

$= 2 + 3 - 4$

$= 1.$

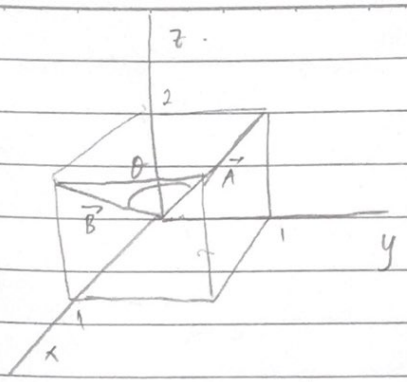
$$\nabla \times \vec{A} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ 2x & 3y & -4z \end{vmatrix}$$



$$= \left(\frac{\partial}{\partial y} \cdot -4z\right)\hat{i} + \left(\frac{\partial}{\partial z} \cdot 3y\right)\hat{i} + \left(\frac{\partial}{\partial x} 3y\right)\hat{k} - \left(\frac{\partial}{\partial y} 2x\right)\hat{k} + \left(\frac{\partial}{\partial z} \cdot 2x\right)\hat{j}$$

$$= -\left(\frac{\partial}{\partial x} \cdot -4z\right)\hat{j}$$

No. :



$\vec{A} = \cancel{x\hat{i}} + 0\hat{i} + \hat{j} + 2\hat{k}$

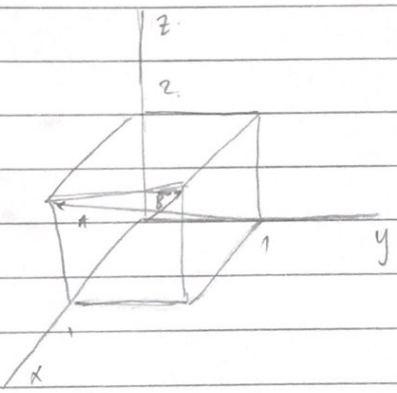
$\vec{B} = \hat{i} + \hat{j} + 2\hat{k}$

$\vec{A} \cdot \vec{B} = |\vec{A}||\vec{B}| \cos\theta$

$4 = \sqrt{5} \cdot \sqrt{5} \cos\theta$

$\cos\theta = \frac{4}{5}$

$\theta = \cos \frac{4}{5}$



$\vec{A} = \hat{i} + \hat{j} + 2k$

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

$\vec{A} \cdot \vec{B} = |\vec{A}||\vec{B}| \cos\theta$

$2 = \sqrt{6}\sqrt{6} \cos\theta$

$\cos\theta = \frac{2}{6} = \frac{1}{3}$

$\theta = \cos \frac{1}{3}$