Indah Dwi Jayanti

21130110049

No.

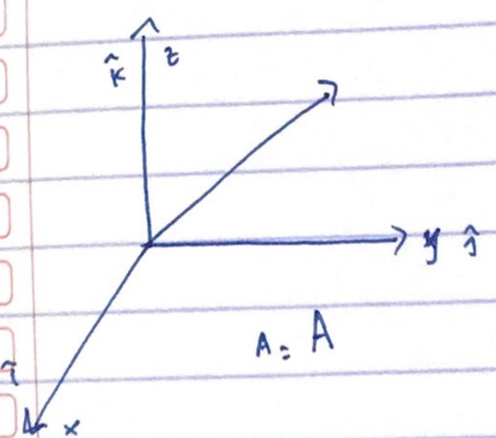
Date. 27 Feb 2024.

A.

KALISMA

OPERATOR DALAM FISIKA

① Analisis Vektor



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

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

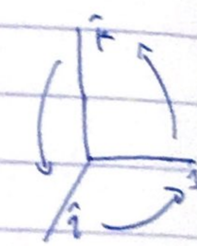
A = A

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

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

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

$$\vec{A} \times \vec{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ x^2y & 3yz & 2xy \\ z & 2yx & 3xz \end{vmatrix} \begin{matrix} \hat{i} & \hat{j} \\ x^2y & 3yz \\ z & 2yx \end{matrix}$$



$$: [3yz \cdot 3xz)\hat{i} + (2xy \cdot 2yx)\hat{i} + [x^2y \cdot 2yx]\hat{k} - (3yz \cdot z)$$
$$+ (2xy \cdot z)\hat{j} - (x^2y \cdot 3xz)\hat{j}$$
$$: (9yxz^2 - 4x^2y^2)\hat{i} + (2x^3y^2 - 3yz^2)\hat{k} + (2xyz -$$
$$3x^3yz)\hat{j}$$

No.

Date.

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

(Pilih salah satu)

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

Operator Nabla (∇)

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

Gradian

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

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

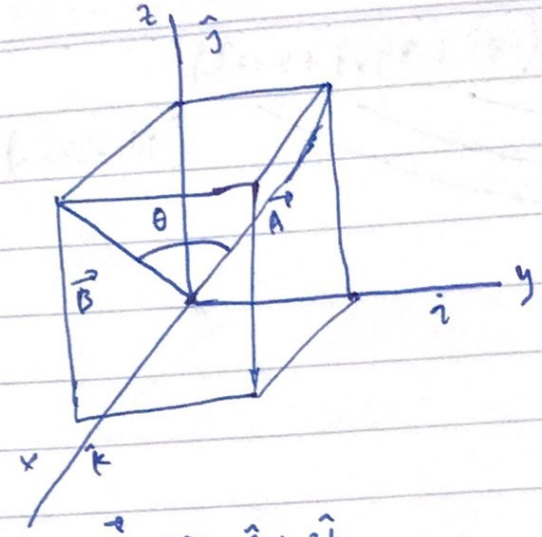
$\therefore = (2xyz + 3y^2z)\hat{i} + (2xy + 6yz)\hat{j} + (2xyz + 3y^2)\hat{k}$

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

$\vec{A} =$

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

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



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

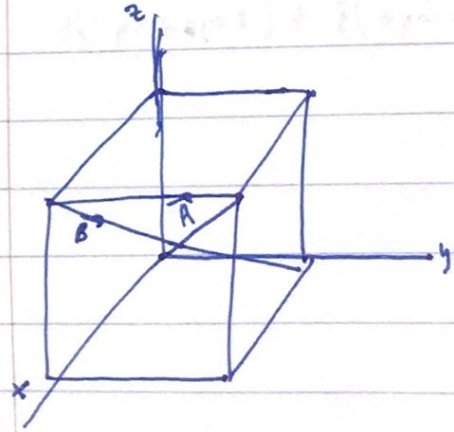
$B = \hat{i} + \hat{j} + 2\hat{k}$

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

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

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

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



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

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

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

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

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

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