

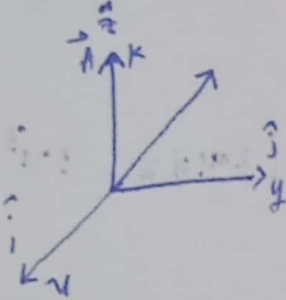
Kelistrikan
Pak Wayan distrik

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Kamis

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Operator dalam fisika.

1. Analisis Vektor



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

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

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

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

Contoh soal

$$\begin{aligned} 1. \vec{A} + \vec{B} &= x^2y\hat{i} + 3yz\hat{j} + 2xy\hat{k} + z\hat{i} + 2yz\hat{j} + 3xz\hat{k} \\ &= (x^2y + z)\hat{i} + (5yz + 2xy)\hat{j} + (2xy + 3xz)\hat{k} \end{aligned}$$

$$\begin{aligned} 2. \vec{A} \cdot \vec{B} &= (x^2y + z)\hat{i} \cdot (3yz + 2xy)\hat{j} + (2xy + 3xz)\hat{k} \\ &= x^2yz\hat{i} \cdot 5yz\hat{j} + 5xyz\hat{k} \end{aligned}$$

$$\vec{A} = 2x\hat{i} + 3y\hat{j} - 4z\hat{k}$$

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

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

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

Operator Maha (∇)

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

Gradien

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

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

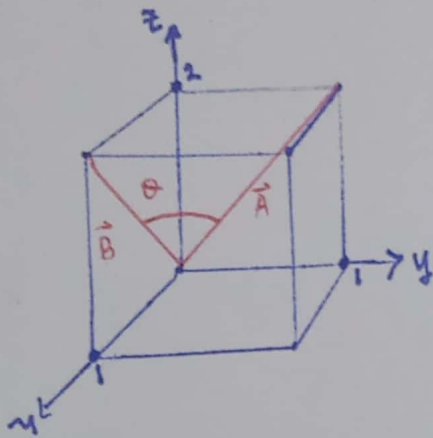
$$= \hat{i} (2y$$

$$\vec{A} = 2x\hat{i} + 3y\hat{j} - 4z\hat{k}$$

$$\nabla \cdot \vec{A} =$$

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

$\Rightarrow$



Diagonal sisi

$$\vec{A} = 0\hat{i} + 1\hat{j} + 2\hat{k}$$

$$\vec{B} = 1\hat{i} + 0\hat{j} + 2\hat{k}$$

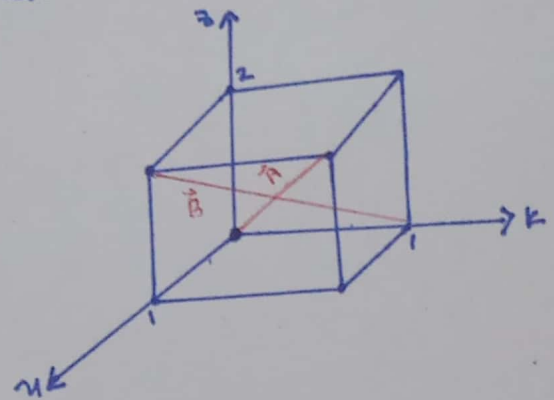
$$\vec{A} \cdot \vec{B} = |\vec{A}| |\vec{B}| \cos \theta$$

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

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

$$\theta = \cos^{-1} \frac{4}{5}$$

Diagonal ruang



$$\vec{A} = 0\hat{i} + 1\hat{j} + 1\hat{k}$$

$$\vec{B} = 1\hat{i} + 1\hat{j} + 1\hat{k}$$

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

$$2 = \sqrt{2} \sqrt{3} \cos \theta$$

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