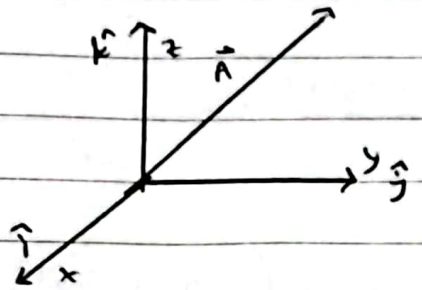
Reza Santra
2213022060

No 22 Feb 2024
Date

KALISMA

* operator dalam Fisika

1.) Analisis vektor



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

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

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

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

$A + B =$

$A \cdot B =$

$A \times B =$

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

$= w^2yz\,\hat{i} + 5y^2zx\,\hat{j} + 5w^2yz\,\hat{k}$

$A \cdot B = (w^2y + z)\hat{i} \cdot (3yz + 2yw)\hat{j} \cdot (2wy + 3xz)\hat{k}$

$= x^2yz \cdot 3xy^2z \cdot 6w^2yz$

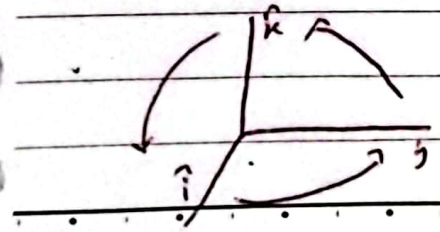
$A \times B = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ w^2y & 3yz & 2xy \\ z & 2yx & 3xz \end{vmatrix}$

$\hat{i} = \hat{j} \cdot \hat{k} - \hat{k} \cdot \hat{j}$

$\hat{j} = \hat{k} \cdot \hat{i} - \hat{i} \cdot \hat{k}$

$\hat{k} = \hat{i} - \hat{j} - \hat{j} \cdot \hat{i}$

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



$\hat{i} \cdot \hat{i} = 1$

$\hat{j} \cdot \hat{j} = 1$

$\hat{k} \cdot \hat{k} = 1$

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Operator nabla

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

gradien

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

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

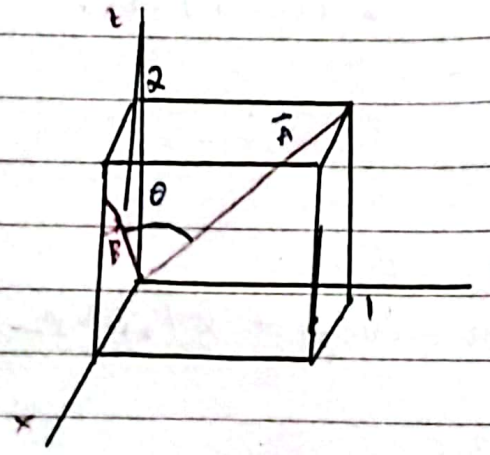
$$= \hat{i}(2xyz) + \hat{j}(x^2z + 6yz) + \hat{k}(x^2y + 3y^2)$$

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

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

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

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



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

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

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

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

$$\cos\theta = \frac{4}{\sqrt{5}} \qquad \theta = \text{inv} \cos\frac{4}{5}$$

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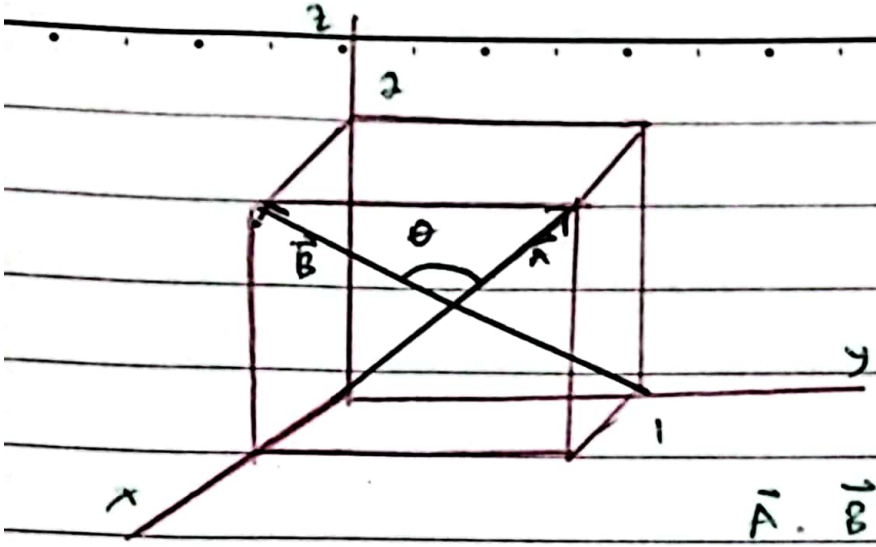

$\vec{A} = \hat{i} + \hat{j} + 2\hat{k}$

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

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

$2 = \sqrt{6}\,\sqrt{4} \cos\theta$

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