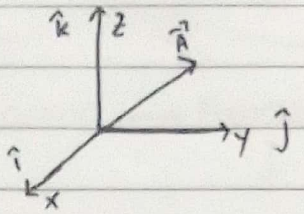
No.
Date:

AMELIA CHOIRUNNISA
2213022045

Operasi dalam Fisika

① Analisis vektor



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

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

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

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

$\vec{A} = A$

- $\vec{A} + \vec{B} = (x^2y + z)\hat{i} +$

- $\vec{A} \cdot \vec{B} = (x^2y + z)\hat{i} + (4y^2x + 2y)\hat{j} + (4x^2y + z)\hat{k}$

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

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

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

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

$= x^2$

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

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

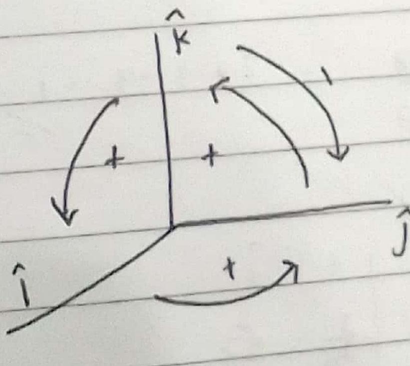
$(2yx \cdot 2xy)\hat{i} - (2xz \cdot x^2y)\hat{j}$

$\cancel{= (6\ 12x z^2 - 2y^2\ 2x^2)\hat{i} + (2xyz - 2x^3\ 2y)\hat{j} + (\ldots)\hat{k}}$

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

$\cancel{= (9xyz^2)\hat{i} + (x^2yz)\hat{j} + (3yx^2 z^2)\hat{k}}$

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



$\vec{A} \times \vec{B}$: mencari vektor satuan $\hat{i} \to \hat{j} \times \hat{k} = +(\hat{j} \times k - \hat{k} \times \hat{j}) + \ldots$

Date:

d = satu dimensi

∂ = 1 dan 2 dimensi

δ = Delta gerak dlm proses Fisika yg memiliki Perubahan sngt besar

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

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

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

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

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

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

$$\nabla\cdot\vec{A} = \frac{\partial(2x)}{\partial x}\hat{i} + \frac{\partial 3y}{\partial y} - \frac{4z}{yz} = 2 + 3 - 4 = 1$$

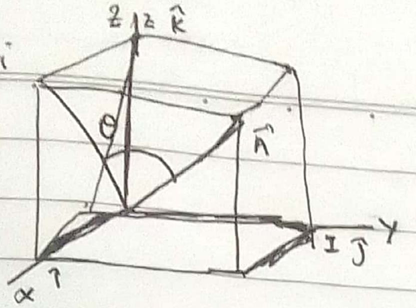
$$\vec{\nabla}\times\vec{A} = \left|\begin{matrix} \hat{i} & \hat{j} & k \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ 2x & 3y & yz \end{matrix}\right| \begin{matrix} \hat{i} & \hat{j} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial x} \\ 2x &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

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

$=$

Sistim koordinat kartesian, seperikel, silinder

Diagonal sisi



$\vec{A} = 0\hat{i} + \hat{j} + 2\hat{k}$ (y) $\rightarrow 1^2 + 2^2 = \sqrt{5}$

$\vec{B} = \hat{i} + 0 + 2\hat{k}$ (x) $\rightarrow 1^2 + 2^2 = \sqrt{5}$

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

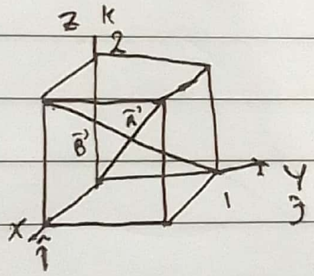
$4 = (\hat{j} + 2k)^2 (1 + 2\hat{k})^2 \cos \theta$

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

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

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

Diagonal ruang



$\vec{A} = 1 + j + 2k \quad = \sqrt{6}$

$\vec{B} = -1 - j + 2k = \sqrt{6}$

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

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

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

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

$\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$