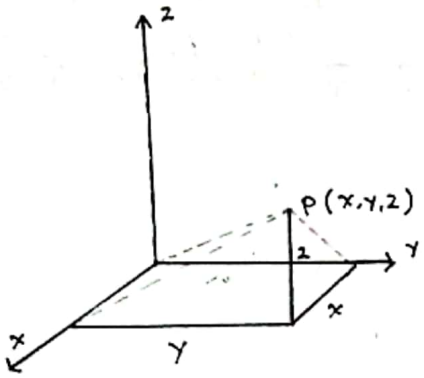
Nama : Dian Permata Hati
NPM : 2013022036 .

Gambar sistem koordinat Cartesius, koordinat silinder, dan koordinat bola.

+ Koordinat Cartesius (x,y,z)



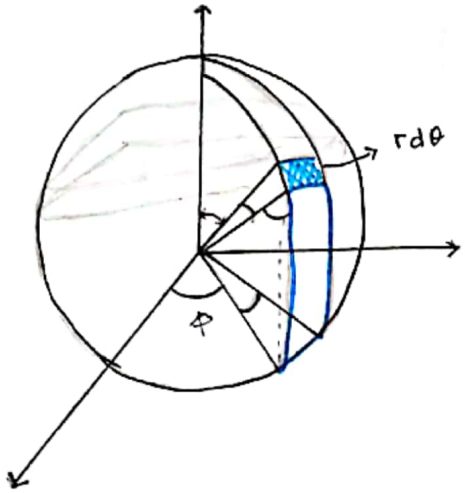
- Gradien : $\nabla t = i\frac{\partial t}{\partial x} + j\frac{\partial t}{\partial y} + k\frac{\partial t}{\partial z}$

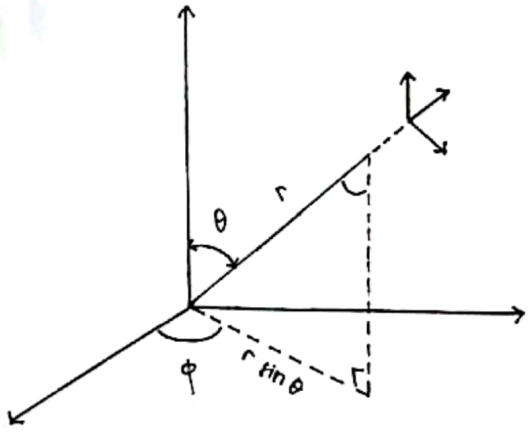
- Divergensi : $\nabla . \vec{V} = \frac{\partial V_x}{\partial x} + \frac{\partial V_y}{\partial y} + \frac{\partial V_z}{\partial z}$

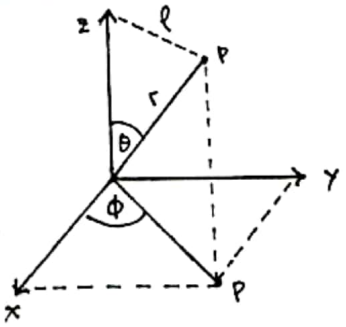
- Rotasi : $\nabla \times \vec{V} = \hat{i}\left(\frac{\partial V_z}{\partial y} - \frac{\partial V_y}{\partial z}\right) + \hat{j}\left(\frac{\partial V_x}{\partial z} - \frac{\partial V_z}{\partial x}\right) + \hat{k}\left(\frac{\partial V_y}{\partial x} - \frac{\partial V_x}{\partial y}\right)$.

$$= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ V_x & V_y & V_z \end{vmatrix}.$$

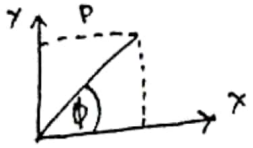
* Koordinat Bola (r, θ, φ)







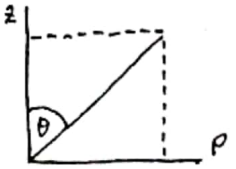
* Analisis xy



$\sin\phi = \frac{y}{\rho}$, $y = \rho \sin\phi$

$x = \rho \cos\phi$

* Analisis z ρ



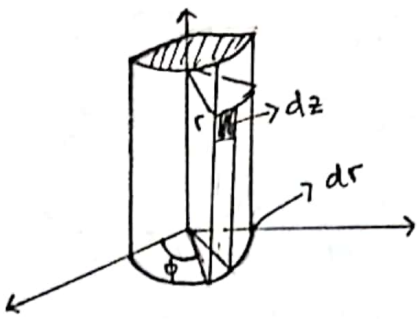
$z = r\cos\theta$

$\rho = r \sin\theta$

- Gradien : $\nabla t = \hat{r}\ \frac{\partial t}{\partial r} + \hat{\theta}\left(\frac{1}{r}\ \frac{\partial t}{\partial \theta}\right) + \hat{\phi}\left(\frac{1}{r \sin\theta}\ \frac{\partial t}{\partial \phi}\right)$

- Divergensi : $\nabla . \vec{v} = \frac{1}{r^2}\left(\frac{\partial}{\partial r}\ r^2 V_r\right) + \frac{1}{r \sin\theta}\ \frac{\partial}{\partial \theta}\left(V_\theta \sin\theta\right) + \frac{1}{r \sin\theta}$.

Koordinat silinder



- Gradienn: $\nabla t = \hat{r}\left(\frac{\partial t}{\partial r}\right) + \hat{\phi}\left(\frac{1}{r}\frac{\partial t}{\partial \phi}\right) + \hat{a}\left(\frac{\partial t}{\partial z}\right)$

- Divergensi : $\nabla . \vec{v} = \frac{1}{r}\left(\frac{\partial}{\partial r}\right)(r V_\rho) + \frac{1}{r}\ \frac{\partial V_\phi}{\partial \phi} + \frac{\partial V_z}{\partial z}$