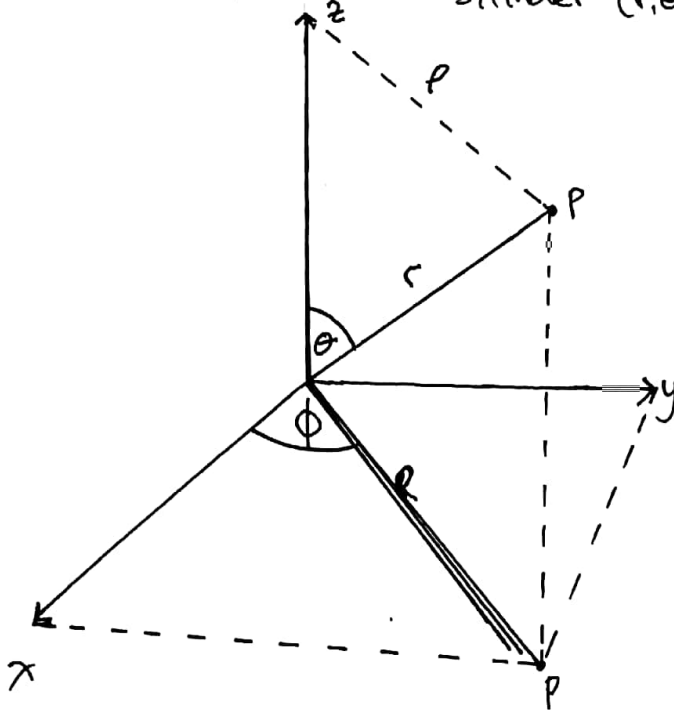


Nama = Chairani Kartini S. Harry
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 Kelas B

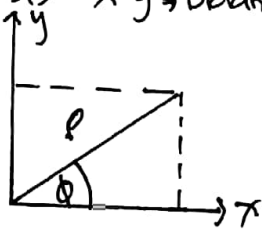
- A. sistem koordinat bola (r, θ, ϕ)
 B. sistem koordinat silinder (r, θ, z)

Pers. koordinat bola:

$$\begin{aligned}x &= \rho \cos \phi \\x &= r \sin \theta \cos \phi \\y &= \rho \sin \phi \\y &= r \sin \theta \sin \phi \\z &= r \cos \theta\end{aligned}$$

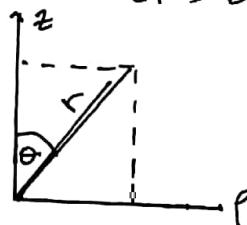


* Analisis $x, y \rightarrow$ bidang xy

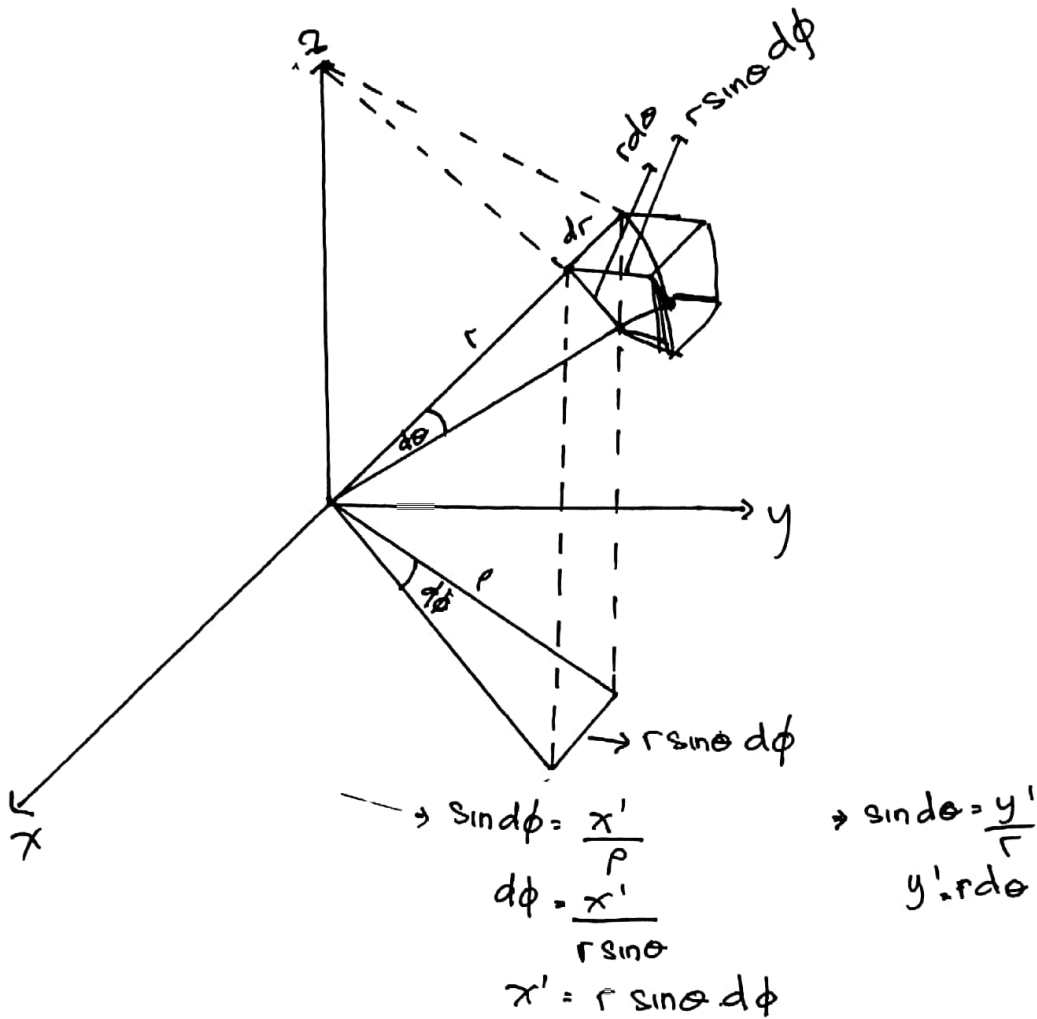


$$\begin{aligned}\sin \phi &= \frac{y}{\rho} \Rightarrow y = \rho \sin \phi \\x &= \rho \cos \phi \\z &= z\end{aligned}$$

* Analisis $z, \rho \rightarrow$ bidang $z\rho$



$$\begin{aligned}z &= r \cos \theta \\ \rho &= r \sin \theta\end{aligned}$$



Maka $dv = dr \cdot r d\theta \cdot r \sin \theta d\phi$

$dv = r^2 dr \sin \theta d\theta d\phi \rightarrow$ Elemen volume

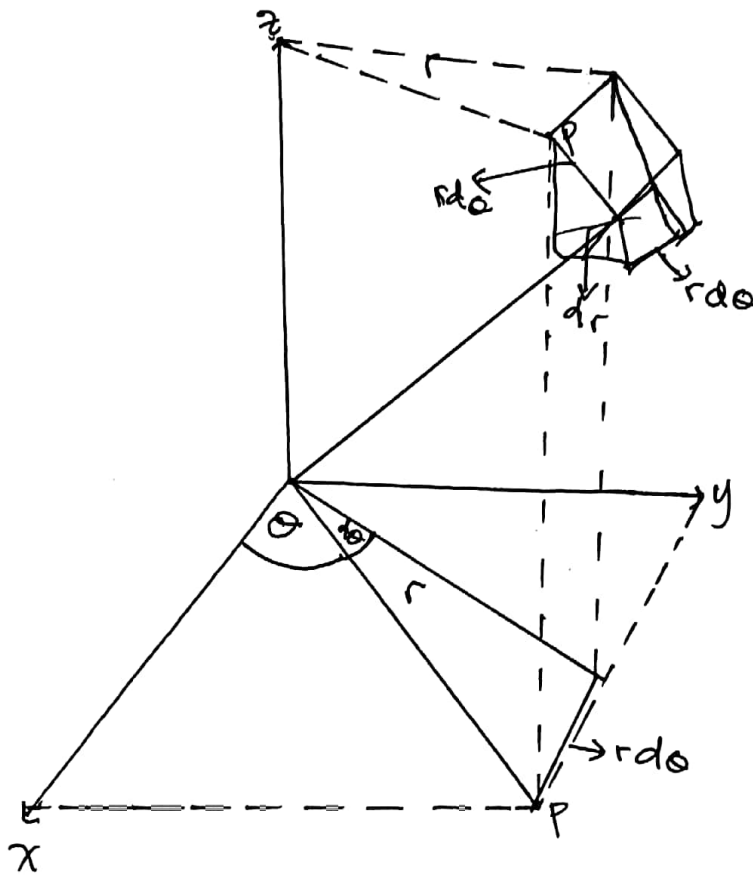
$\rightarrow dv = r^2 \sin \theta dr d\theta d\phi$

$ds = r d\theta \cdot r \sin \theta d\phi$

$\rightarrow ds = r^2 \sin \theta d\theta d\phi \rightarrow$ Elemen Luas permukaan

$\rightarrow dl^2 = dr^2 + r^2 d\theta^2 + r^2 \sin^2 \theta d\phi^2 \rightarrow$ Elemen panjang

B. Sistem koordinat silinder



$$\begin{aligned} r \sin \theta &= \frac{y}{r}, y = r \sin \theta \\ x &= r \cos \theta \\ z &= z \end{aligned}$$

$$\begin{aligned} r \sin \theta &= \frac{r'}{r} \\ r' &= r \sin \theta \\ r' &= r d\theta \end{aligned}$$

$$\begin{aligned} \text{Maka } dv &= dr r d\theta dz \\ &= r dr d\theta dz \end{aligned}$$

$$dA = r d\theta dz$$

$$ds^2 = dr^2 + r^2 d\theta^2 + dz^2$$