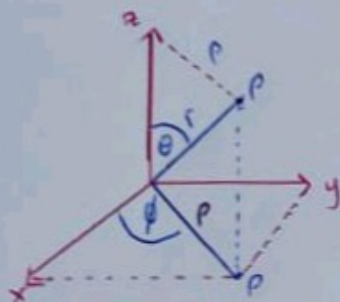


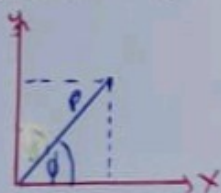
Nama : Nadiyah Sofitri
NPM : 2013022046

Koordinat Bola ($r \theta \phi$)



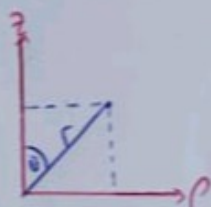
$$\begin{aligned}x &= \rho \cos \phi \\x &= r \sin \theta \cos \phi \\y &= \rho \sin \phi \\y &= r \sin \theta \sin \phi \\z &= r \cos \theta\end{aligned}$$

analisis $x y$

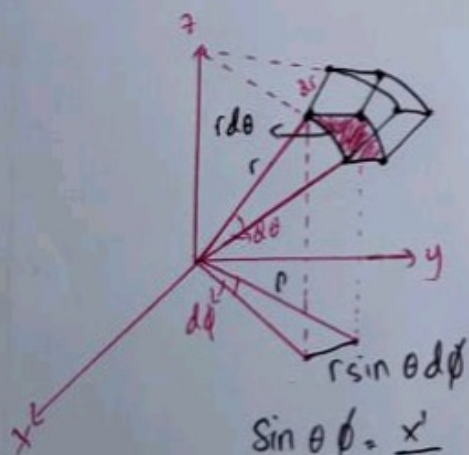


$$\begin{aligned}\sin \phi &= \frac{y}{\rho}, y = \rho \sin \phi \\x &= \rho \cos \phi\end{aligned}$$

analisis $z \rho$



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



$$\sin \theta \phi = \frac{x'}{\rho}$$

$$d\phi = \frac{x'}{\rho \sin \theta}$$

$$x' = r \sin \theta d\phi$$

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

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

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

$$dv = r^2 \sin \theta dr d\theta d\phi \Rightarrow \text{elemen Volume}$$

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

$$dA = r^2 \sin \theta d\theta d\phi \Rightarrow \text{elemen luas}$$

$$d\ell^2 = dr^2 + r^2 d\theta^2 + r^2 \sin^2 \theta d\phi^2$$

$\downarrow$
elemen panjang