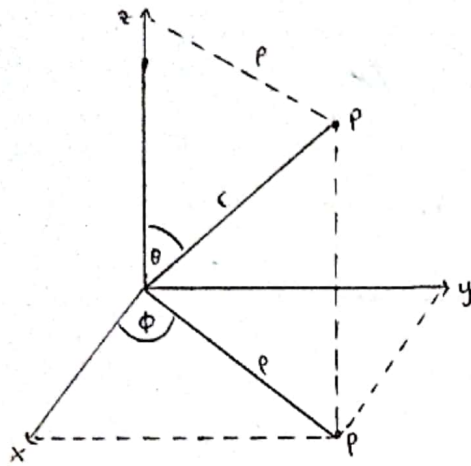
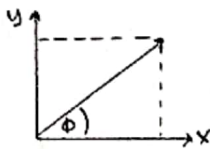


Koordinat Bola (r, θ, ϕ)



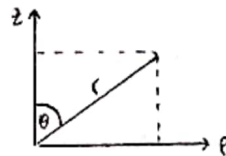
$$\begin{aligned}x &= r \cos \phi \\x &= r \sin \theta \cos \phi \\y &= r \sin \phi \\y &= r \sin \theta \sin \phi \\z &= r \cos \theta\end{aligned}$$

• Analisis x, y

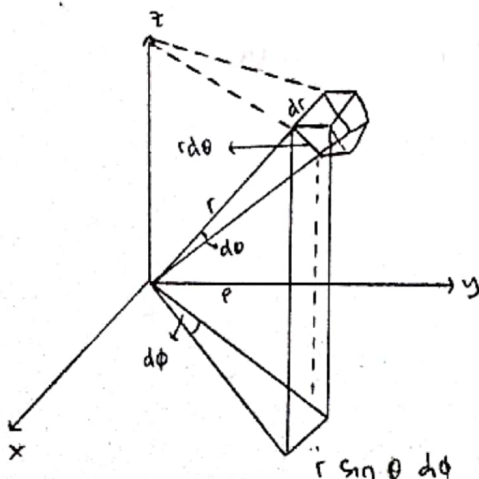


$$\begin{aligned}\sin \phi &= \frac{y}{\rho}, y = \rho \sin \phi \\x &= \rho \cos \phi\end{aligned}$$

• Analisis z, ρ



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

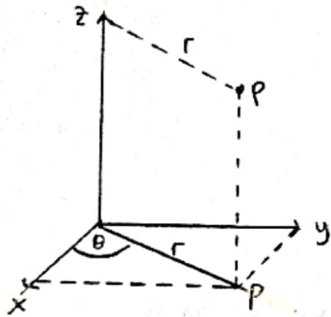


$$\begin{aligned}dV &= dr \cdot r d\theta \cdot r \sin \theta d\phi \\dV &= r^2 \sin \theta dr d\theta d\phi \\dV &= r^2 \sin \theta dr d\theta d\phi \\dA &= r d\theta \cdot r \sin \theta d\phi \\dA &= r^2 \sin \theta d\theta d\phi \\dL^2 &= dr^2 + r^2 d\theta^2 + r^2 \sin^2 \theta d\phi^2\end{aligned}$$

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

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

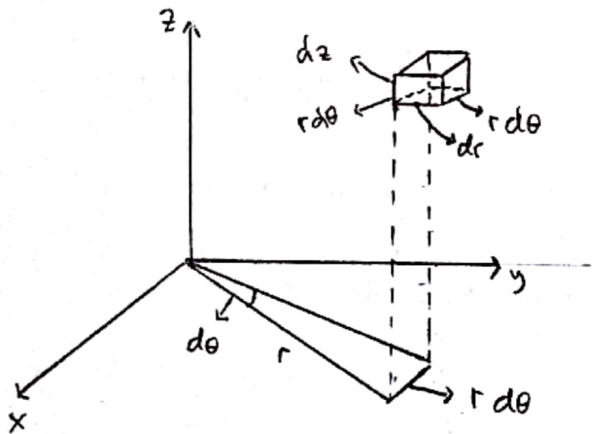
Koordinat spheris (r, θ , z)



$$\sin \theta = \frac{y}{r}, \quad y = r \sin \theta$$

$$x = r \cos \theta$$

$$z = z$$



$$dV = dr \cdot r d\theta \cdot dz$$

$$dV = r dr d\theta dz$$

$$dA = r d\theta \cdot dz$$

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

$$\sin d\theta = \frac{x'}{r}$$

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

$$x' = r d\theta$$