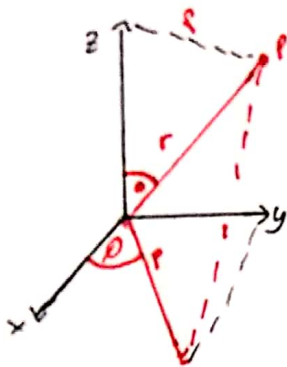


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- Koordinat Bola  $\langle r, \theta, \phi \rangle$ .



$$x = r \cos \phi$$

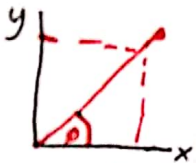
$$x = r \sin \theta \cos \phi$$

$$y = r \sin \phi$$

$$y = r \sin \theta \sin \phi$$

$$z = r \cos \theta$$

- Analisis  $x, y$



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

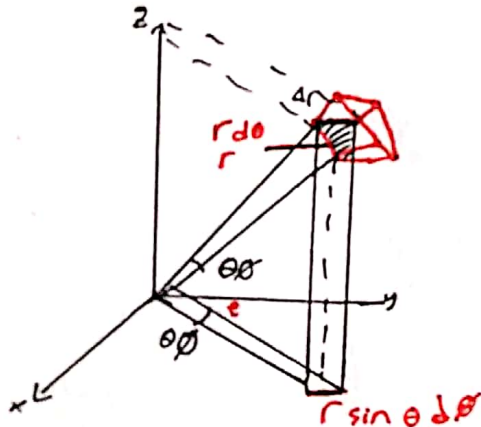
$$x = r \cos \theta$$

- Analisis  $z, r$



$$z = r \cos \theta$$

$$r = \frac{z}{\cos \theta}$$



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

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

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

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

$$dA = r^2 \sin \theta d\theta d\phi$$

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

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

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

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

- Divergensi koordinat Bola.

$$\text{Div } D = \frac{1}{r^2} \frac{\partial}{\partial r} \langle r^2 D_r \rangle + \frac{1}{r \sin \theta} \frac{\partial}{\partial \theta} \langle \sin \theta D_\theta \rangle + \frac{1}{r \sin \theta} \frac{\partial}{\partial \phi} \langle \sin \theta D_\phi \rangle$$