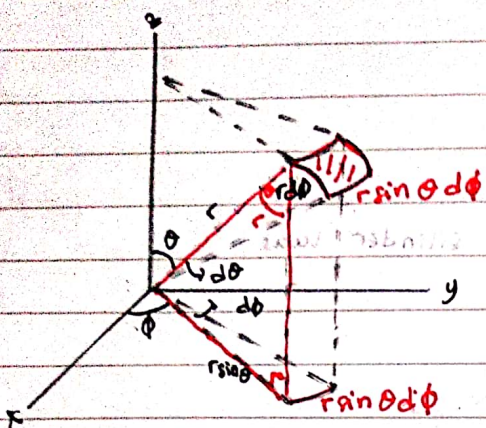


koordinat bola luas



$$dA = (r d\theta)(r \sin \theta d\phi)$$

$$A = \int_{\theta=0}^{\pi} \int_{\phi=0}^{2\pi} r^2 \sin \theta d\theta d\phi$$

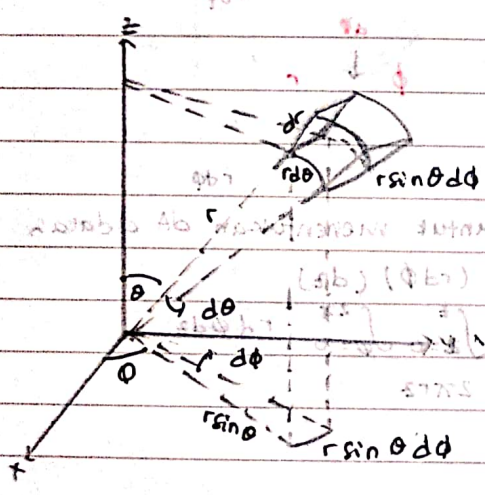
$$A = r^2 (2\pi) \int_{\theta=0}^{\pi} \sin \theta d\theta$$

$$A = 2\pi r^2 [-\cos \theta]_0^{\pi}$$

$$A = 2\pi r^2 [-(-1) - (-1)]$$

$$A = 4\pi r^2$$

koordinat Volume



$$dV = (r d\theta)(r \sin \theta d\phi)(dr)$$

$$V = \int_{r=0}^R \int_{\theta=0}^{\pi} \int_{\phi=0}^{2\pi} (r d\theta)(r \sin \theta d\phi)(dr)$$

$$V = \int_{r=0}^R \int_{\theta=0}^{\pi} \int_{\phi=0}^{2\pi} (r^2 dr) (\sin \theta d\theta d\phi)$$

$$V = 2\pi \int_{r=0}^R \int_{\theta=0}^{\pi} (r^2 dr) (\sin \theta d\theta)$$

$$V = 4\pi \int_{r=0}^R r^2 dr = \frac{4}{3} \pi r^3$$

koordinat bola volume

$$V = \int_0^R \int_0^{\pi} \int_0^{2\pi} r^2 \sin \theta dr d\theta d\phi$$

$$V = \int_0^R r^2 dr \int_0^{\pi} \sin \theta d\theta \int_0^{2\pi} d\phi$$

$$V = \left[\frac{r^3}{3} \right]_0^R \left[-\cos \theta \right]_0^{\pi} \left[\phi \right]_0^{2\pi}$$

$$V = \frac{R^3}{3} (1 - (-1)) (2\pi)$$

$$V = \frac{4}{3} \pi R^3$$

koordinat bola volume