

Actividad de aula 2

① Halle una ecuación en coordenadas esféricas de la ecuación dada en coordenadas rectangulares

$$1) x^2 + y^2 = 16$$

$$x^2 + y^2 + z^2 = 16 + z^2$$

$$\rho^2 = 16 + (\rho \cos \theta)^2$$

$$\rho^2 = 16 + \rho^2 \cos^2 \theta$$

$$\rho^2 - \rho^2 \cos^2 \theta = 16$$

$$\rho^2 (1 - \cos^2 \theta) = 16$$

$$\rho^2 = \frac{16}{1 - \cos^2 \theta}$$

$$\rho = \sqrt{\frac{16}{1 - \cos^2 \theta}}$$

$$\rho = \frac{4}{\sqrt{1 - \cos^2 \theta}}$$

$$2) X^2 + Y^2 = 2Z^2$$

$$\Rightarrow X^2 + Y^2 + Z^2 = 2Z^2 + Z^2$$

$$\rho^2 = 3Z^2$$

$$\rho^2 = 3(\rho \cos \theta)^2$$

$$\rho^2 = 3\rho^2 \cos^2 \theta$$

$$\frac{\rho^2}{\rho^2} = 3 \cos^2 \theta$$

$$1 = 3 \cos^2 \theta$$

$$\cos \theta = \frac{1}{3}$$

$$\theta = \arccos \frac{1}{3}$$

$$3) x^2 + y^2 + z^2 - qz = 0$$

$$\Rightarrow \rho^2 - qz = 0$$

$$\rho^2 - q\rho \cos \theta = 0$$

$$\rho(\rho - q \cos \theta) = 0$$

$$\rho = 0 \quad \text{ó} \quad \rho - q \cos \theta = 0$$

$$\boxed{\rho = q \cos \theta}$$

Halle la ecuación en coordenadas rectangulares de la ecuación dada en coordenadas esféricas.

$$1) \rho = 5$$

$$\rho^2 = x^2 + y^2 + z^2$$

$$\rho^2 = (5)^2$$

$$\rho^2 = 25$$

$$x^2 + y^2 + z^2 = 25$$

=

$$2) \theta = \pi/2$$

$$\theta = \tan^{-1}(x/y)$$

$$\tan^{-1}(x/y) = \pi/2$$

$$x/y = \tan(\pi/2)$$

$$\frac{x}{y} = \frac{\sin \pi/2}{\cos \pi/2}$$

$$\frac{x}{y} = \frac{1}{0}$$

$$(0)x = y(1)$$

$$0 = y$$

$$y = 0$$

$$y = \rho \sin \theta \sin \phi$$

$$\rho \sin \theta \cdot \sin \theta = 0$$

$$\rho = 0$$

$$\rho = \pi/2$$

$$3) \rho = 4 \cos \theta$$

$$\rho = 4 \left(\frac{z}{\rho} \right)$$

$$\rho \rho = 4z$$

$$\rho^2 = 4z$$

$$x^2 + y^2 + z^2 = 4z$$

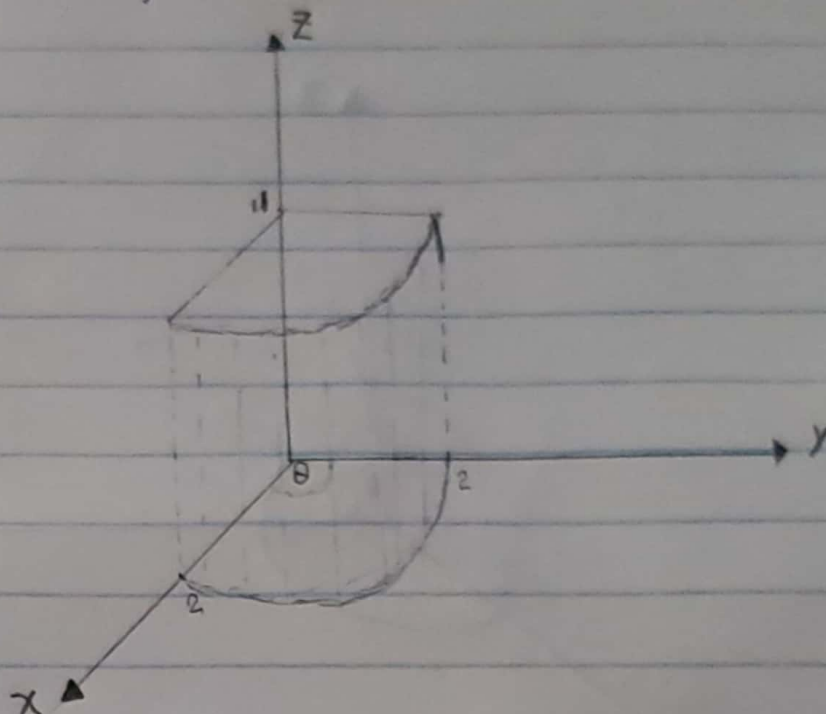
$$x^2 + y^2 + z^2 - 4z = 0$$

$$\rho^2 = x^2 + y^2 + z^2$$

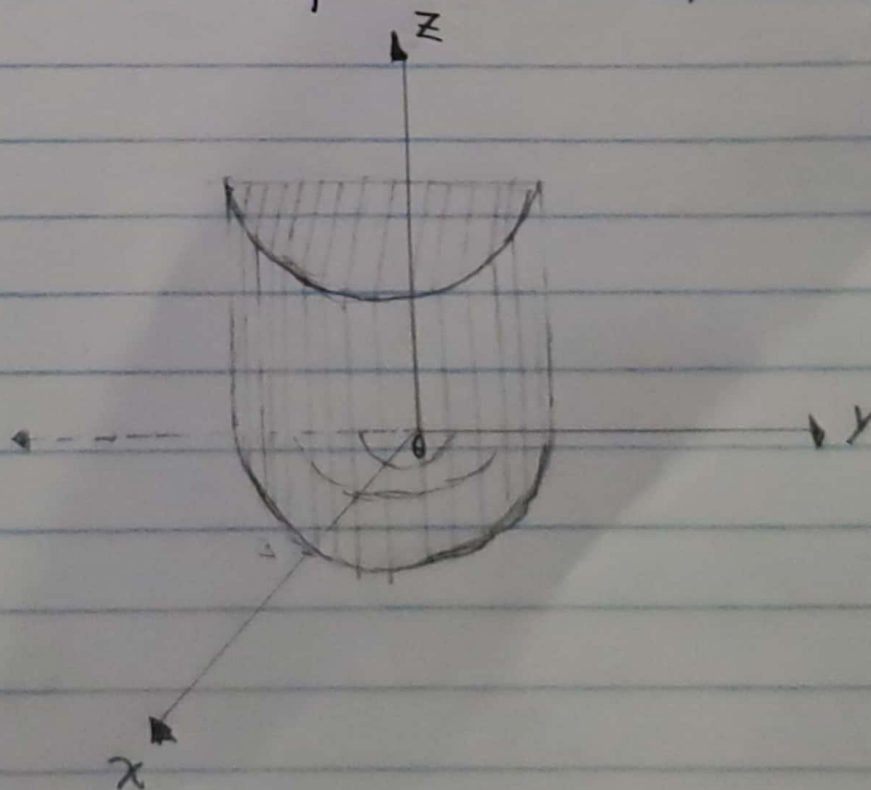
$$\cos \theta = \frac{z}{\rho}$$

③ Haga un bosquejo del sólido que tiene la descripción dada en coordenadas cilíndricas.

1. $0 \leq \theta \leq \pi/2$, $0 \leq r \leq 2$, $0 \leq z \leq 4$



2. $-\pi/2 \leq \theta \leq \pi/2$, $0 \leq r \leq 3$, $0 \leq z \leq r \cos \theta$



1) Haga un bosquejo del sólido que tiene la descripción dada las coordenadas esféricas.

$$1. 0 \leq \theta \leq \pi, \quad 0 \leq \phi \leq \pi/2, \quad 1 \leq \rho \leq 3$$

