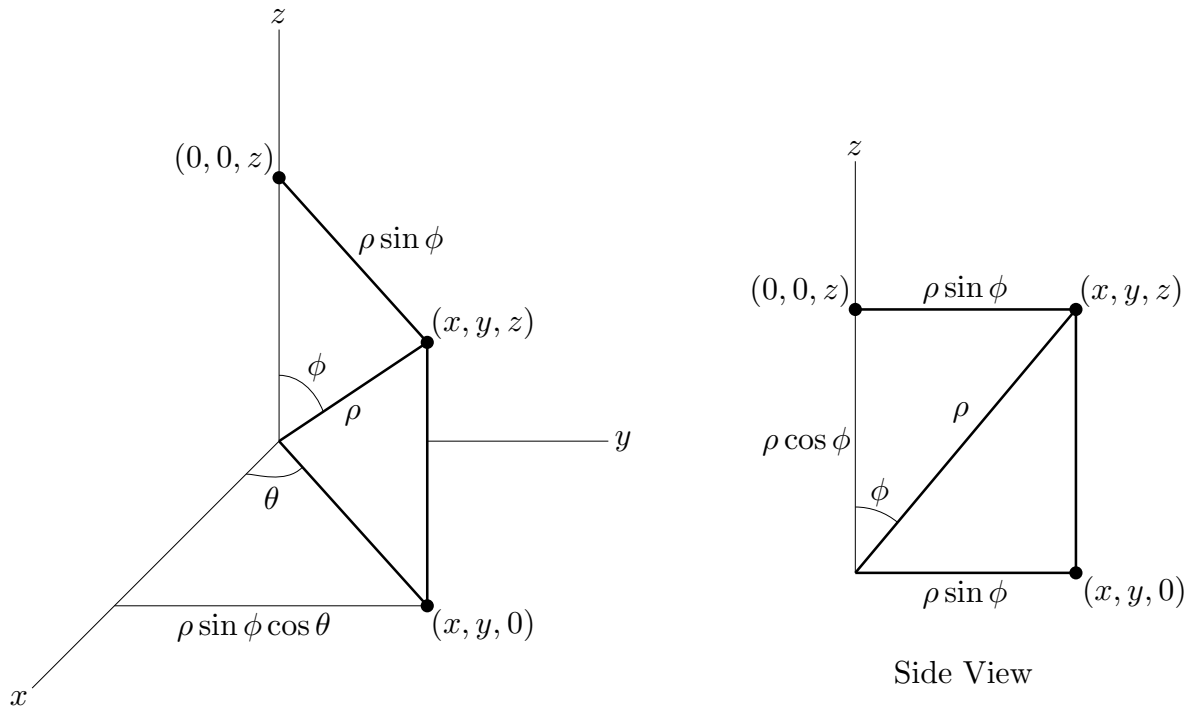


SPHERICAL COORDINATES



ρ = distance from (x, y, z) to $(0, 0, 0)$

ϕ = angle between the line $\overline{(0, 0, 0)(x, y, z)}$ and the z axis

θ = angle between the line $\overline{(0, 0, 0)(x, y, 0)}$ and the x axis

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

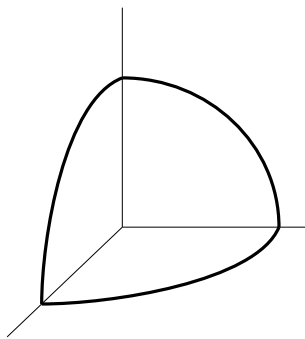
$$y = \rho \sin \phi \sin \theta$$

$$z = \rho \cos \phi$$

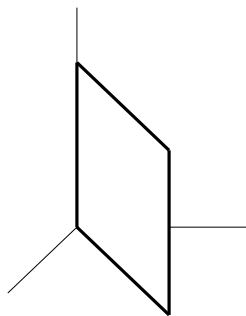
$$\rho = \sqrt{x^2 + y^2 + z^2}$$

$$\theta = \tan^{-1} \frac{y}{x}$$

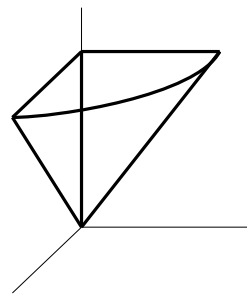
$$\phi = \tan^{-1} \frac{\sqrt{x^2 + y^2}}{z}$$



surface of constant ρ



surface of constant θ



surface of constant ϕ