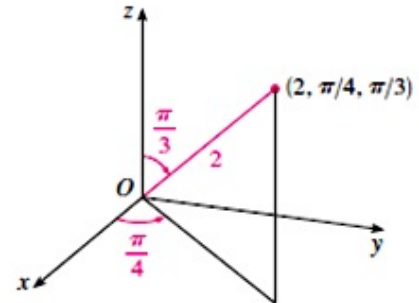
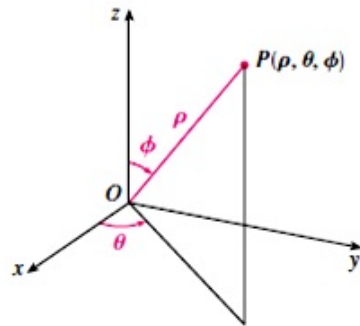


Math 32 – Workshop #23

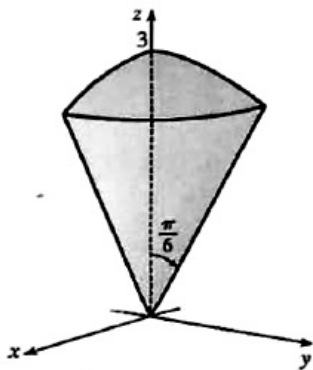
1. A point in spherical coordinates is denoted by (ρ, θ, ϕ) , illustrated by the pictures below. Sketch a graph of the region described by the following equations and inequalities in \mathbb{R}^3 .



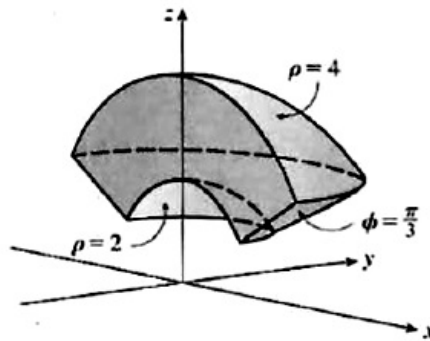
- (a) $\phi = \frac{3\pi}{4}$
 (b) $\rho = 1, \frac{\pi}{3} \leq \phi \leq \frac{2\pi}{3}$
 (c) $\theta = \frac{3\pi}{2}$
 (d) $\rho \geq 1, \theta = \frac{\pi}{2}, \frac{\pi}{4} \leq \phi \leq \frac{3\pi}{4}$

2. Give the spherical equation(s) or inequalities that describe the solid region.

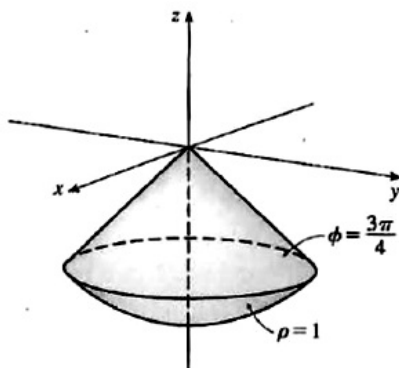
a)



b)



c)



d) (Let the positive x -intercepts be 2 and 4.)

