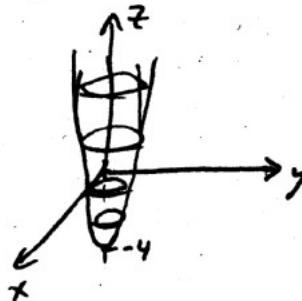


Quiz 3
Math 202 F01

Name: Solutions
02/09/06

1. Write an equation for $z = 2x^2 + 2y^2 - 4$ in cylindrical coordinates, and use your new equation to easily sketch the graph in three dimensions.

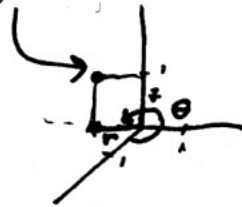
Since $r = \sqrt{x^2 + y^2}$, $z = 2(x^2 + y^2) - 4$ becomes $z = 2r^2 - 4$



2. Express the point with rectangular coordinates $(0, -1, 1)$ in:

(a) cylindrical coordinates

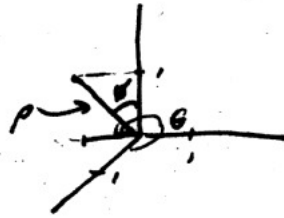
$$(r, \theta, z) = (1, \frac{3\pi}{2}, 1) \text{ or } (1, -\frac{\pi}{2}, 1)$$



(b) spherical coordinates

$$(\rho, \theta, \phi) = (\sqrt{2}, \frac{3\pi}{2}, \frac{\pi}{4})$$

$$\text{or } (\sqrt{2}, -\frac{\pi}{2}, \frac{\pi}{4})$$



3. Give (memorized) formulas expressing rectangular coordinates x, y, z in terms of spherical coordinates ρ, θ, ϕ .

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

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

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