

Announcement: Midterm I: Thursday, Oct.05, 2006, 6:30-7:45PM 102 Forum.

(1) (2 points) Describe and sketch the surface:

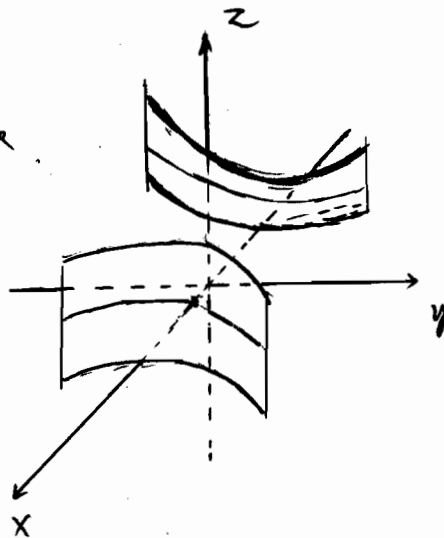
$$x^2 - y^2 = 1$$

Solution: Since z is missing

each horizontal trace $\begin{cases} x^2 - y^2 = 1 \\ z = k \end{cases}$

is a copy of the same hyperbola in the plane $z = k$.

Thus, the surface $x^2 - y^2 = 1$ is a hyperbolic cylinder with rulings parallel to the z -axis.



(2) (3 points) Change from rectangular to spherical coordinates.

$$(-1, 1, \sqrt{6})$$

$$\text{Solution: } \rho = \sqrt{1+1+6} = 2\sqrt{2}$$

$$\cos \phi = \frac{\sqrt{6}}{2\sqrt{2}} = \frac{\sqrt{3}}{2} \Rightarrow \phi = \frac{\pi}{6}$$

$$\cos \theta = \frac{-1}{2\sqrt{2} \sin(\frac{\pi}{6})} = -\frac{1}{\sqrt{2}} \Rightarrow \theta = \frac{3\pi}{4} \quad (\text{since } y > 0)$$

Thus, the spherical coordinates are $(2\sqrt{2}, \frac{3\pi}{4}, \frac{\pi}{6})$