Meghan Grenier Scribe 10/13/09

Meghan G. is relieved the first test is behind us.

Announcements: Exam 2: The Curse of the exam 10/29

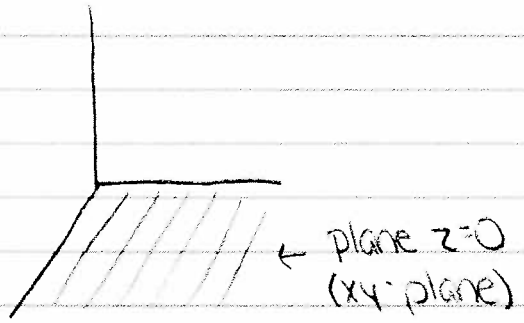
Outline: cylinders and quadratic surfaces

13.6 (final section of Ch. 13)

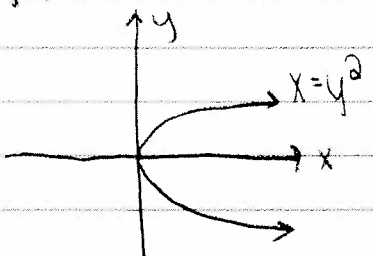
$y^2 = x$ Question: what does the set of points in 3D space satisfying this equation look like?

Observation: this equation is independent of z, so we can take any z-value we like and restrict to that value.

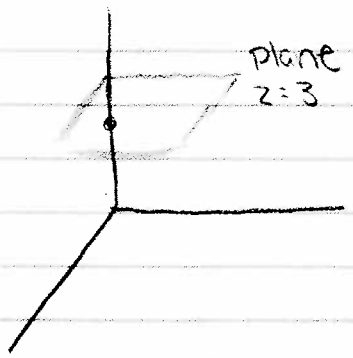
we pick $z=0$

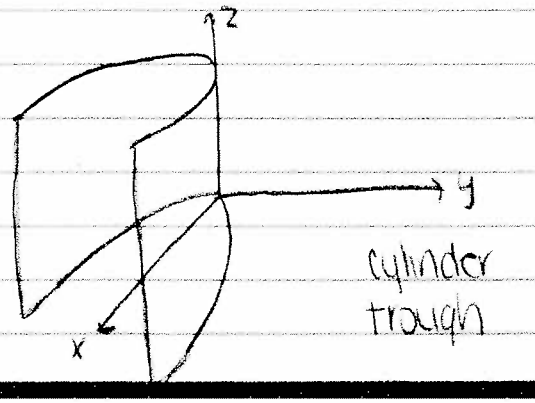


looking from above the xy-plane looks like:



(z-axis is pointing at us)



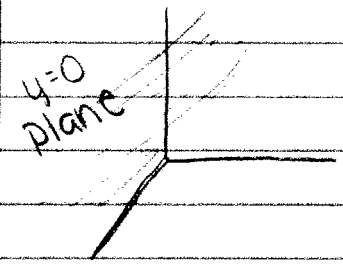


cylinder trough

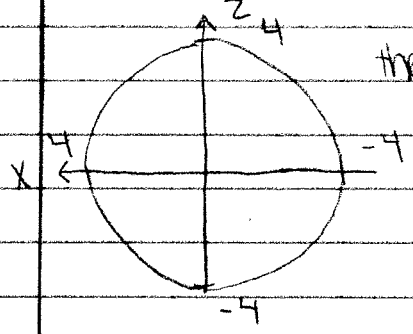
Definition: the intersection of the graph $y^2 = x$ with the plane $z = k$ is called a horizontal trace of the graph

Today: try to recognize graphs by their traces

ex: $x^2 + z^2 = 16$



y = anything (so look at the traces of this graph in the plane $y = k$ ← any constant)

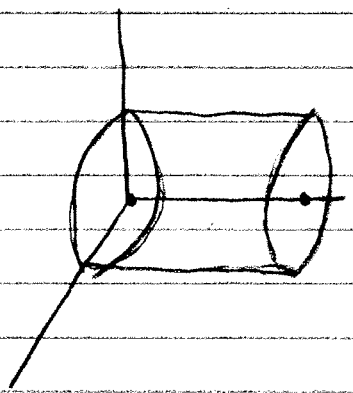


the $y = k$ plane

← $x^2 + y^2 = 16$ is a circular cylinder with radius 4 centered on the y-axis

(y is pointing at us)

on xyz-plane:

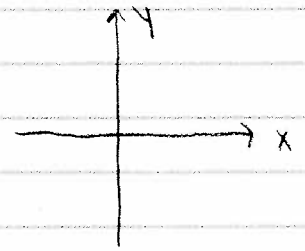


ex: $z = 4x^2 + y^2$ (has all 3 variables)

Let's look at traces:

1) z = constant
2) y = constant

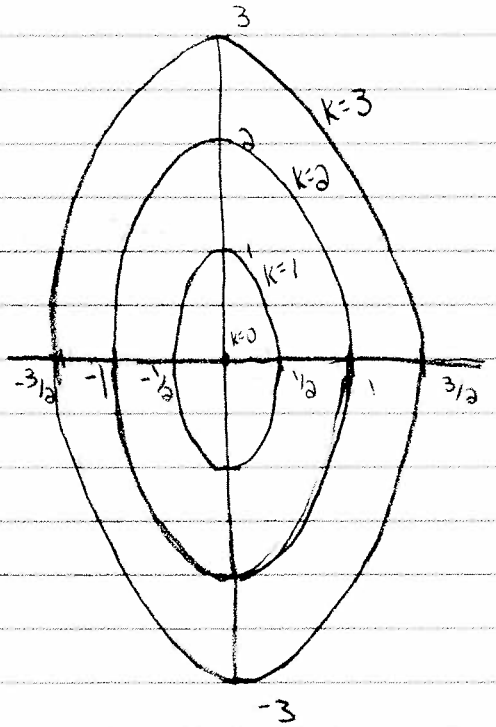
$z = k$



$k = 4x^2 + y^2$ ← k will never be negative

Since $4x^2 + y^2 \geq 0$ the intersection of this graph with the plane z = negative # is empty.

If $k \geq 0$ then the intersection with $z = k$ is elliptical.



A paraboloid

$k=0$: $0 = 4x^2 + 4y^2$

$(0,0)$

$k=1$: $1 = 4x^2 + 4y^2$

$(\pm \frac{1}{2}, \pm 1)$

$k=4$: $4 = 4x^2 + y^2$

$x=0$

$4 = y^2$

$\pm 2 = y$

$y=0$

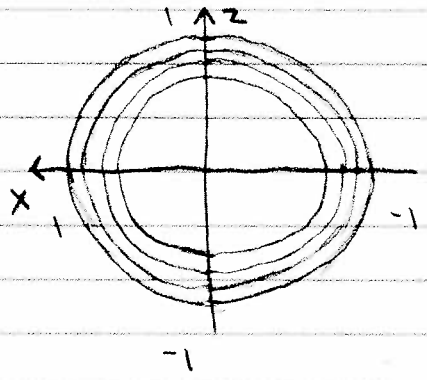
$1 = x^2$

$\pm 1 = x$

pg. 847 #17 ✓

$36x^2 + y^2 + 36z^2 = 36$

$y = k$



$36 - k = 36x^2 + 36z^2$

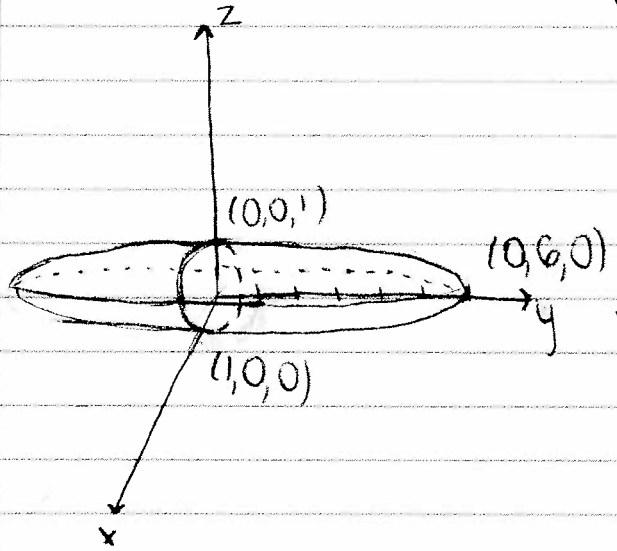
$k = 0$: $36 = 36x^2 + 36z^2$

$x = 0$ $36 = 36z^2$

$z = \pm 1$

$z = 0$ $36 = 36x^2$

$x = \pm 1$



$k = 2$: $34 = 36x^2 + 36z^2$

$x = 0$ $34 = 36z^2$

$z = \pm .97$

$z = 0$ $34 = 36x^2$

$x = \pm .97$

$k = 5$: $31 = 36x^2 + 36z^2$

$x = 0$ $31 = 36z^2$

$z = \pm .93$

$z = 0$ $31 = 36x^2$

$x = \pm .93$

$k = 6$: $30 = 36x^2 + 36z^2$

$x = 0$ $30 = 36z^2$

$z = \pm .91$

$z = 0$ $30 = 36x^2$

$x = \pm .91$