

Math 16C

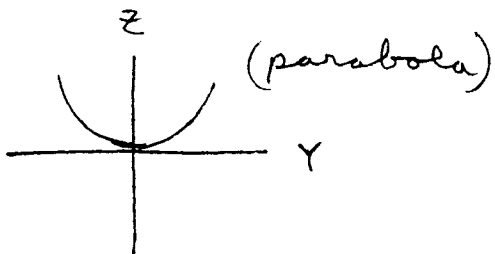
Kouba

Examples of Surfaces in 3-D Space

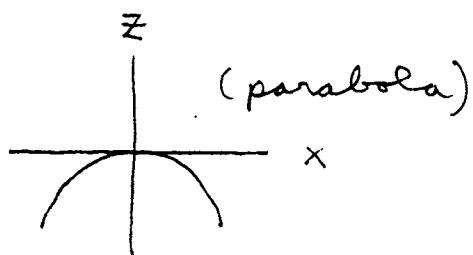
Example: Let $z = y^2 - x^2$.

Traces —

$$x=0: z = y^2$$

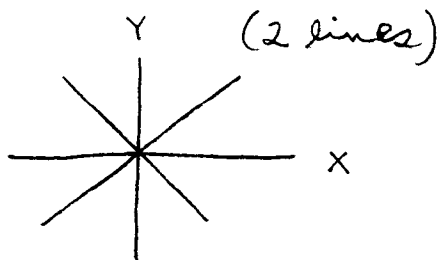


$$y=0: z = -x^2$$



$$z=0: 0 = y^2 - x^2$$

$$\rightarrow y = \pm x$$

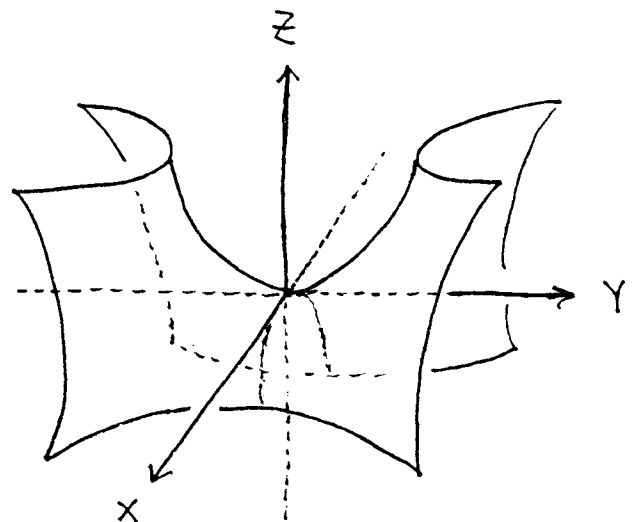
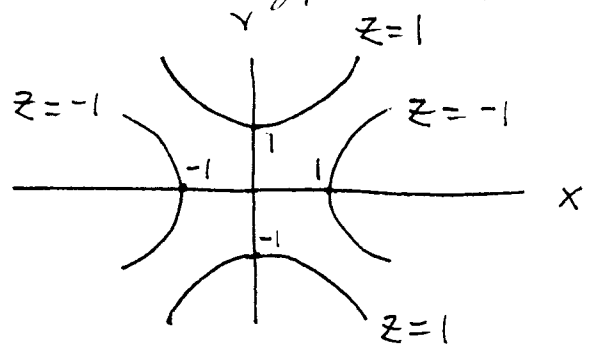


z-values Level Curves

$$z = +1 \quad 1 = y^2 - x^2$$

$$z = -1 \quad -1 = y^2 - x^2$$

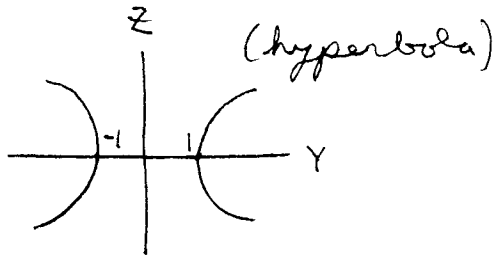
(each is hyperbola)



Example: Let $Y^2 = x^2 + z^2 + 1$.

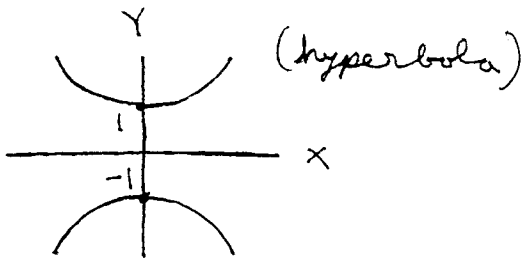
Traces:

$x=0: Y^2 - z^2 = 1$



$Y=0: -1 = x^2 + z^2$
(impossible!?!?★)

$z=0: Y^2 - x^2 = 1$



Y-values

Level Curves

$Y = -3$

$x^2 + z^2 = 8$

$Y = -2$

$x^2 + z^2 = 3$

$Y = -1$

$x^2 + z^2 = 0$

$Y = 1$

$x^2 + z^2 = 0$

$Y = 2$

$x^2 + z^2 = 3$

$Y = 3$

$x^2 + z^2 = 8$

(each is circle or point)

