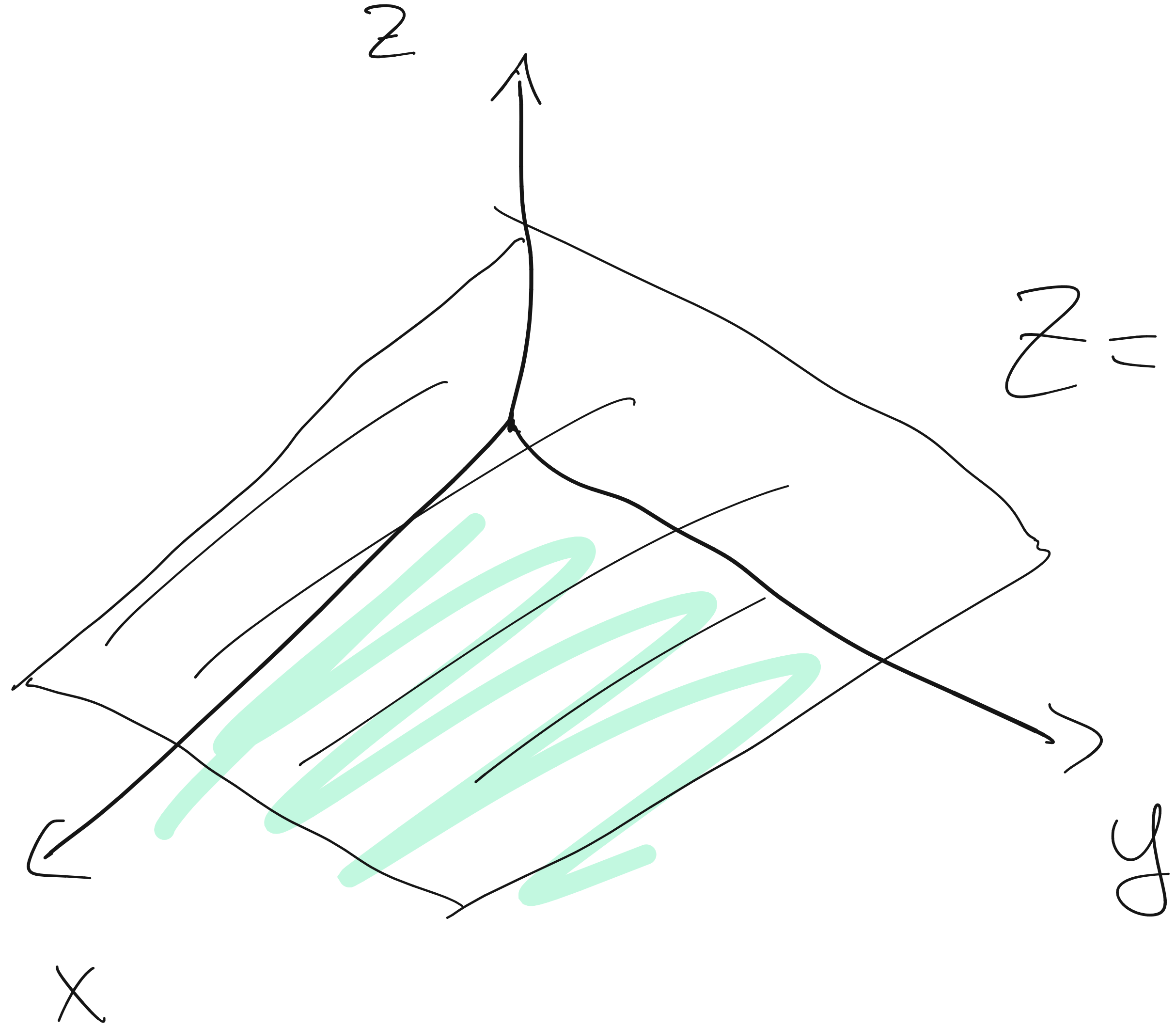
Drawing Planes!

xy plane

$z = 0$

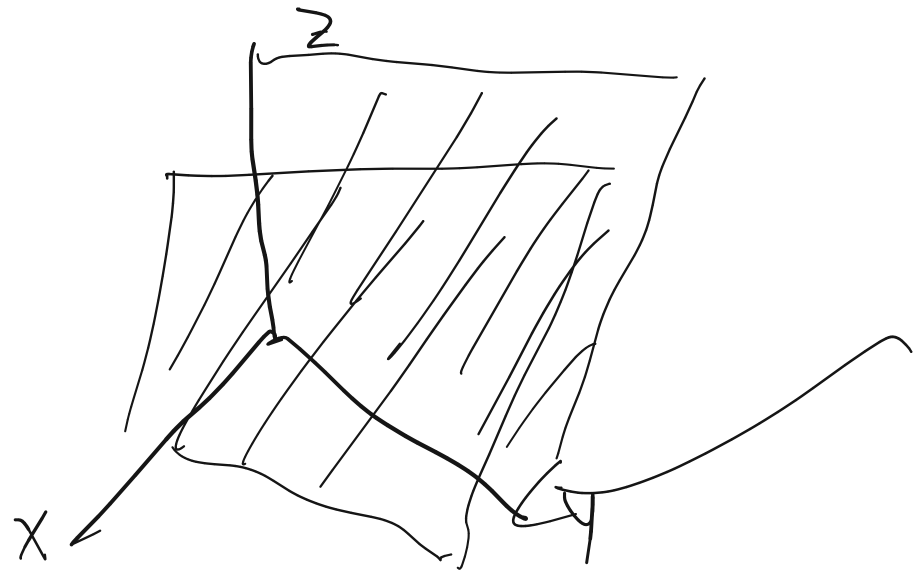
$z = c$

$c \neq 0$



$z = c$

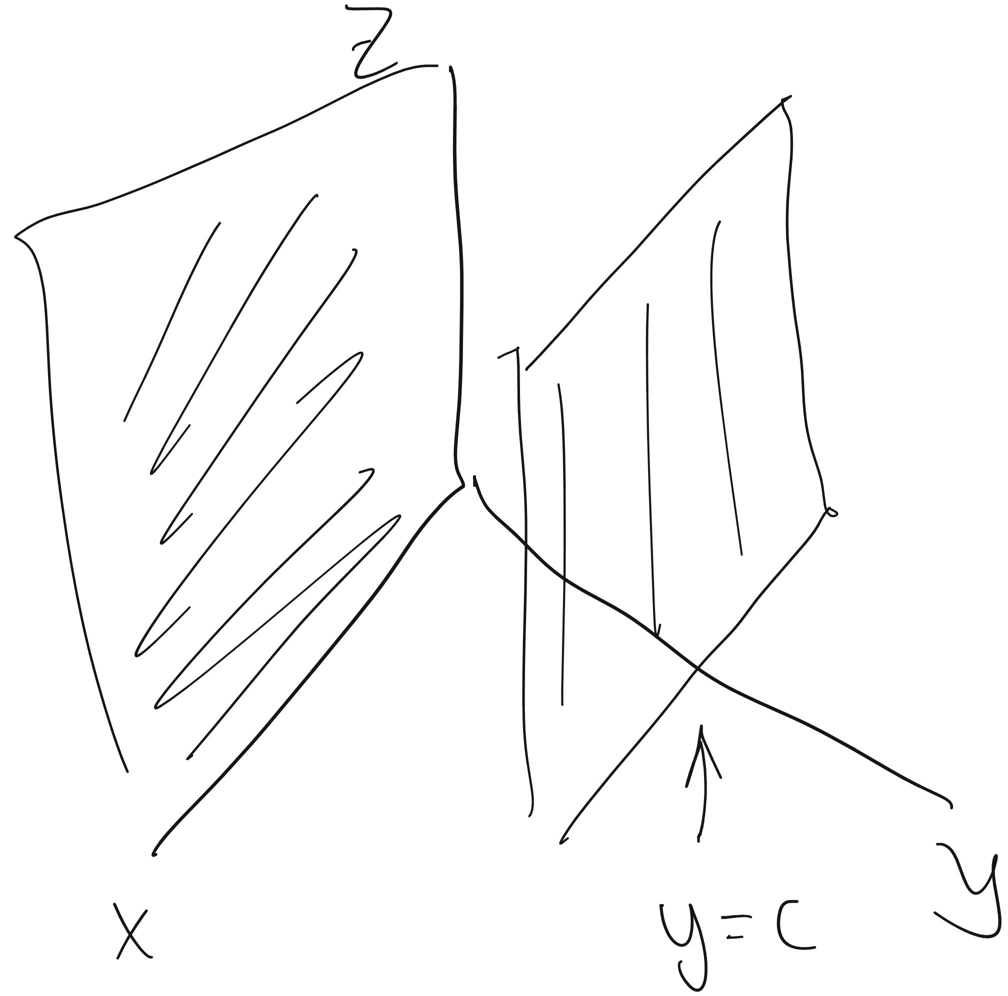
yz-plane has eqn $x = 0$



$x = c$

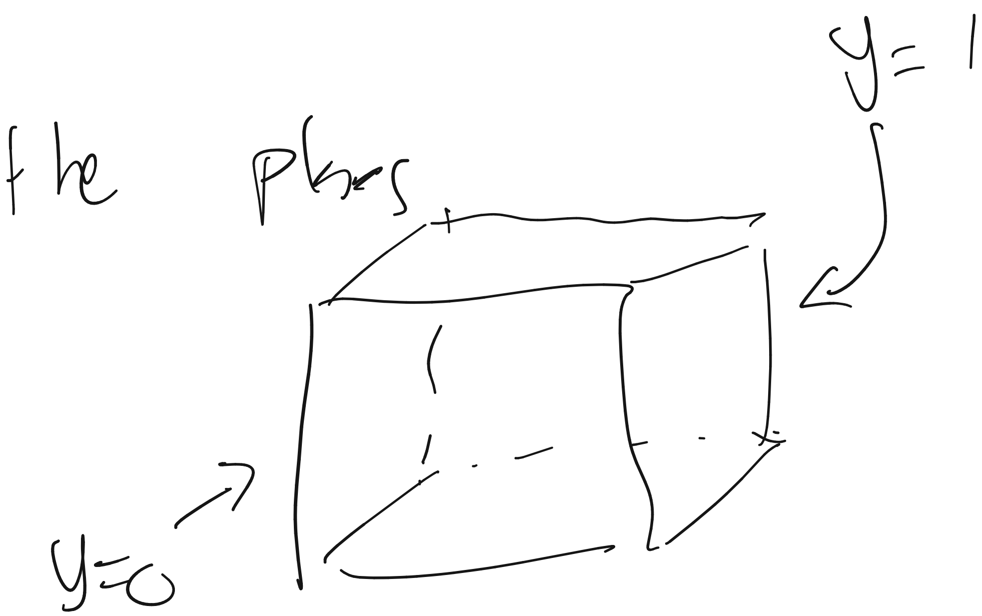
$x = c$

XZ plane has eqn $y = 0$



$y = c$

"unit cube" is made of the planes



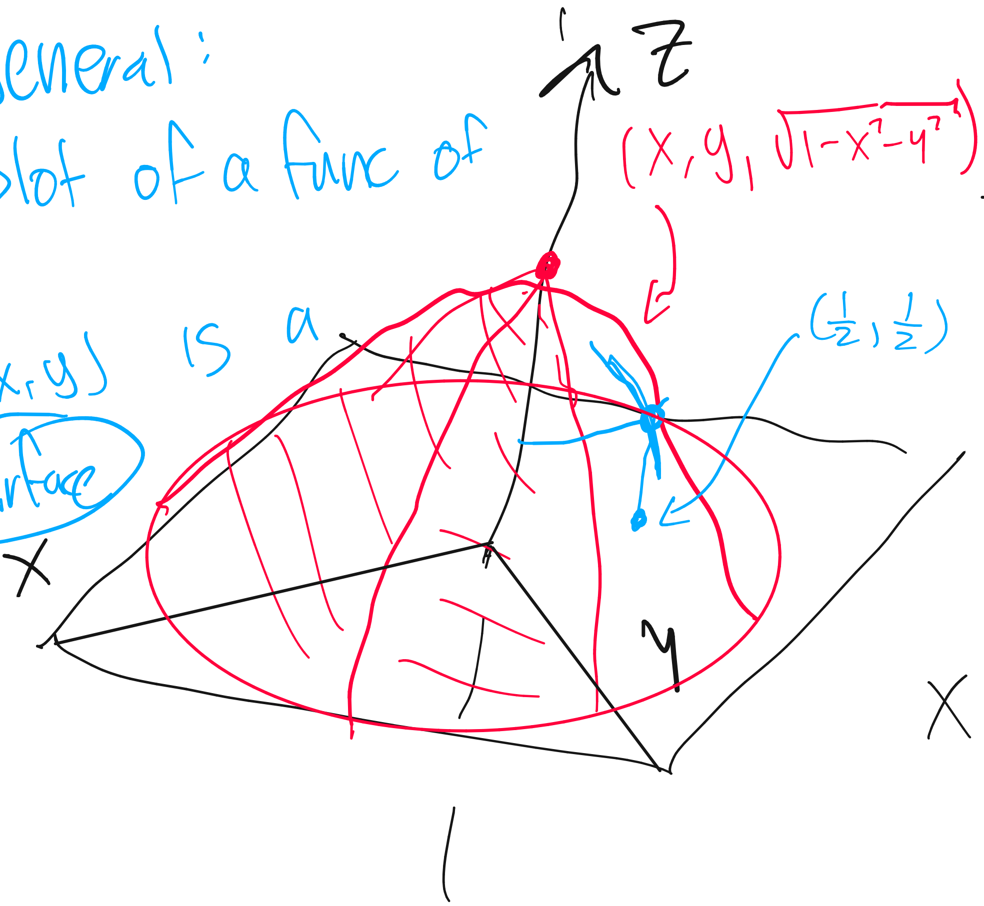
$x=0$, $y=0$, $z=0$ and

$x=1$, $y=1$, $z=1$

~ 9.1.3 ?

The <u>graph of a function</u> $z = f(x,y)$ is the set of all points of the form $(x, y, f(x,y))$ where (x,y) is in domain of $f(x,y)$

In general: the plot of a func of form $z = f(x,y)$ is a 2D surface



<u>Ex</u> $f(x,y) = \sqrt{1-x^2-y^2}$

Domain: $x^2+y^2 \leq 1$

$f(0,0) = \sqrt{1-0^2-0^2} = 1$

<u>Inputs</u>: points in xy-plane

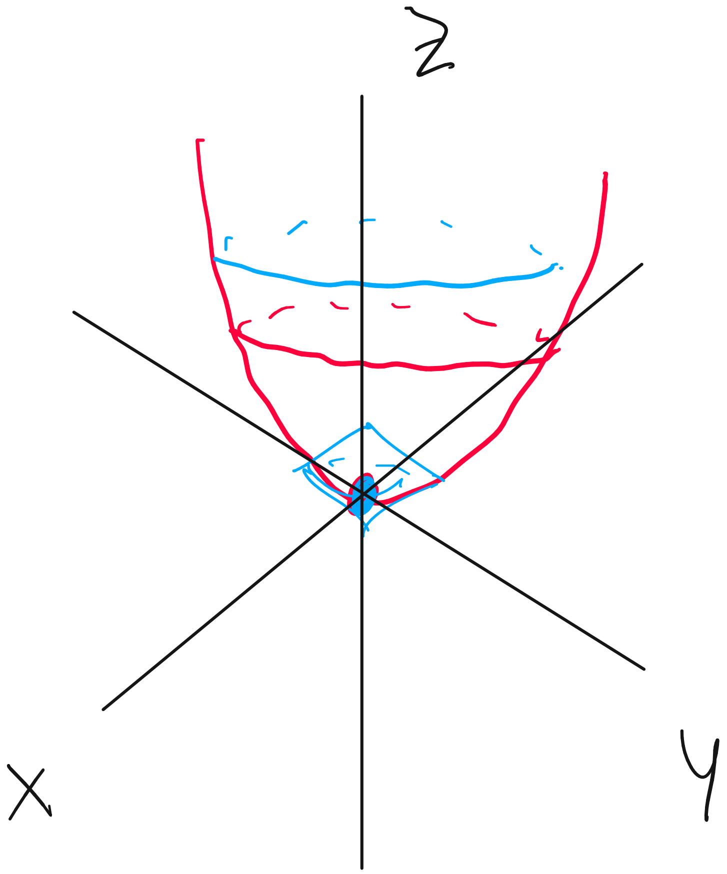
<u>Outputs</u>: heights above/below xy plane.

plot: hemisphere of radius 1 centered @ $(0,0,0)$.

Ex $g(x,y) = x^2 + y^2$

Domain is all of $\mathbb{R}^2$ ← all pairs of real #s

↳ Think: this is all of xy-plane!



$g(0,0) = 0^2 + 0^2 = 0$

→ Note: Vertical cross sections here are circles of the form

$x^2 + y^2 = c^2$

Def'n: the trace, or slice, or horizontal cross section

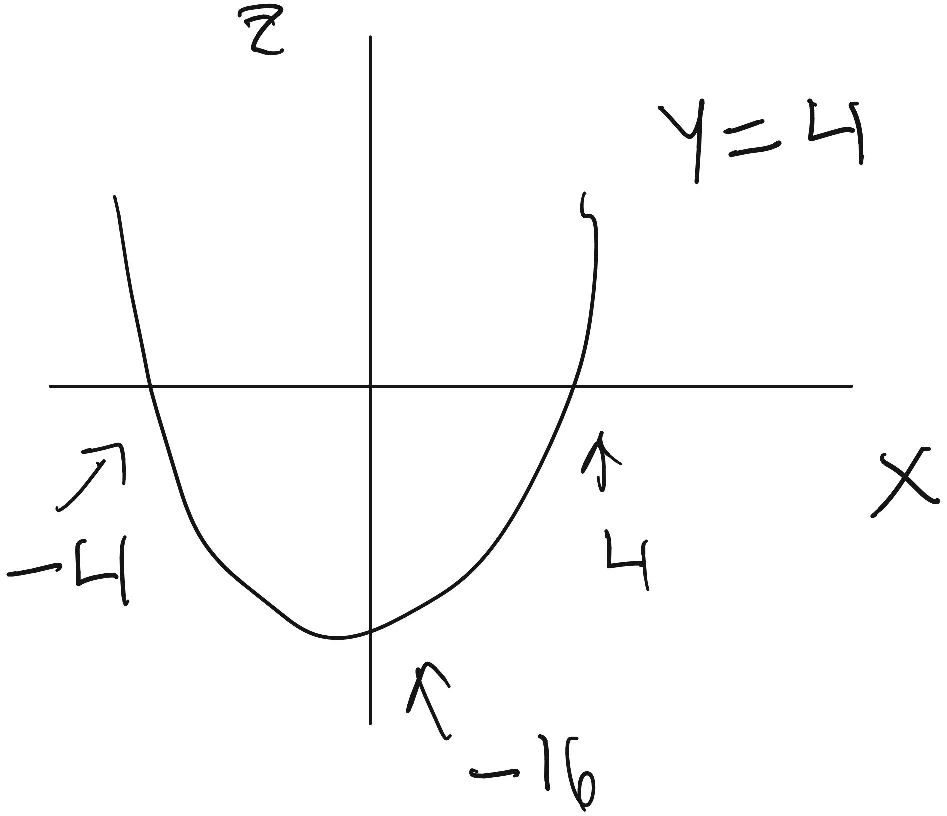
of a function $z = f(x,y)$ is a curve of

the form $z = f(a,y)$ or $z = f(x,b)$

where a, b fixed real #s.

Ex $f(x,y) = x^2 - y^2$.

let's take the $y=4$ trace. $z = f(x,4)$

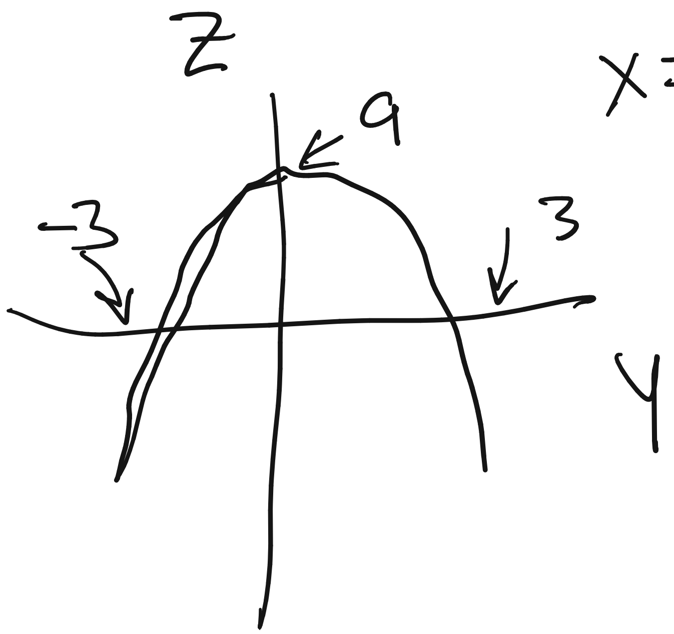


Y=4

$$f(x,4) = x^2 - 16$$

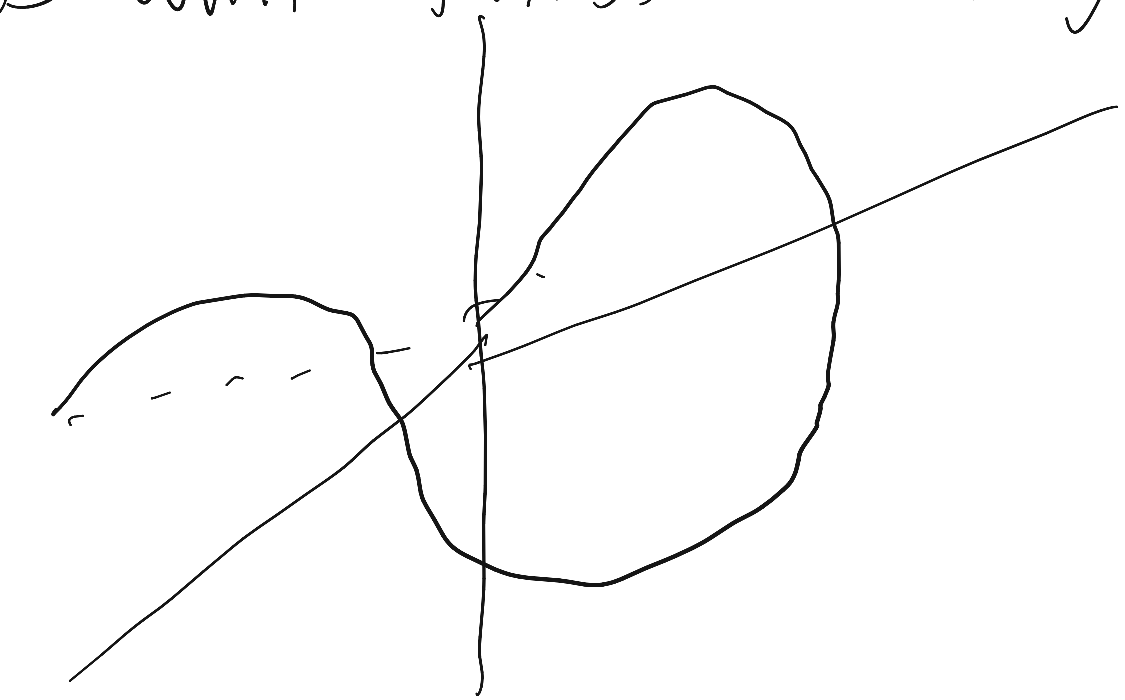
x=3 trace

$$f(3,y) = 9 - y^2$$



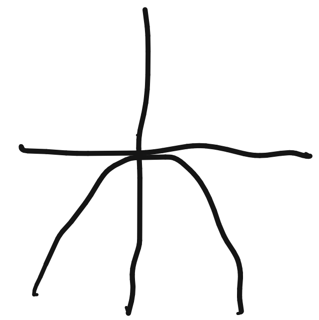
x=3

here's what f(x,y) roughly ~~looks~~ looks like

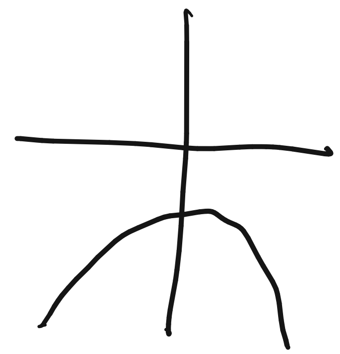


$f(x,y) = y - x^2$

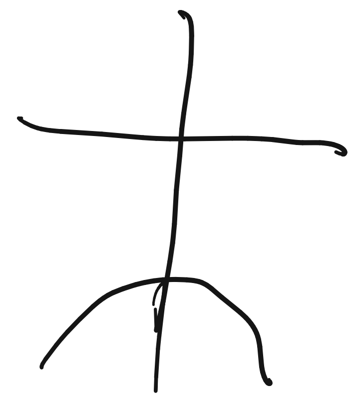
$y=0$ trace: $f(x,0) = -x^2$

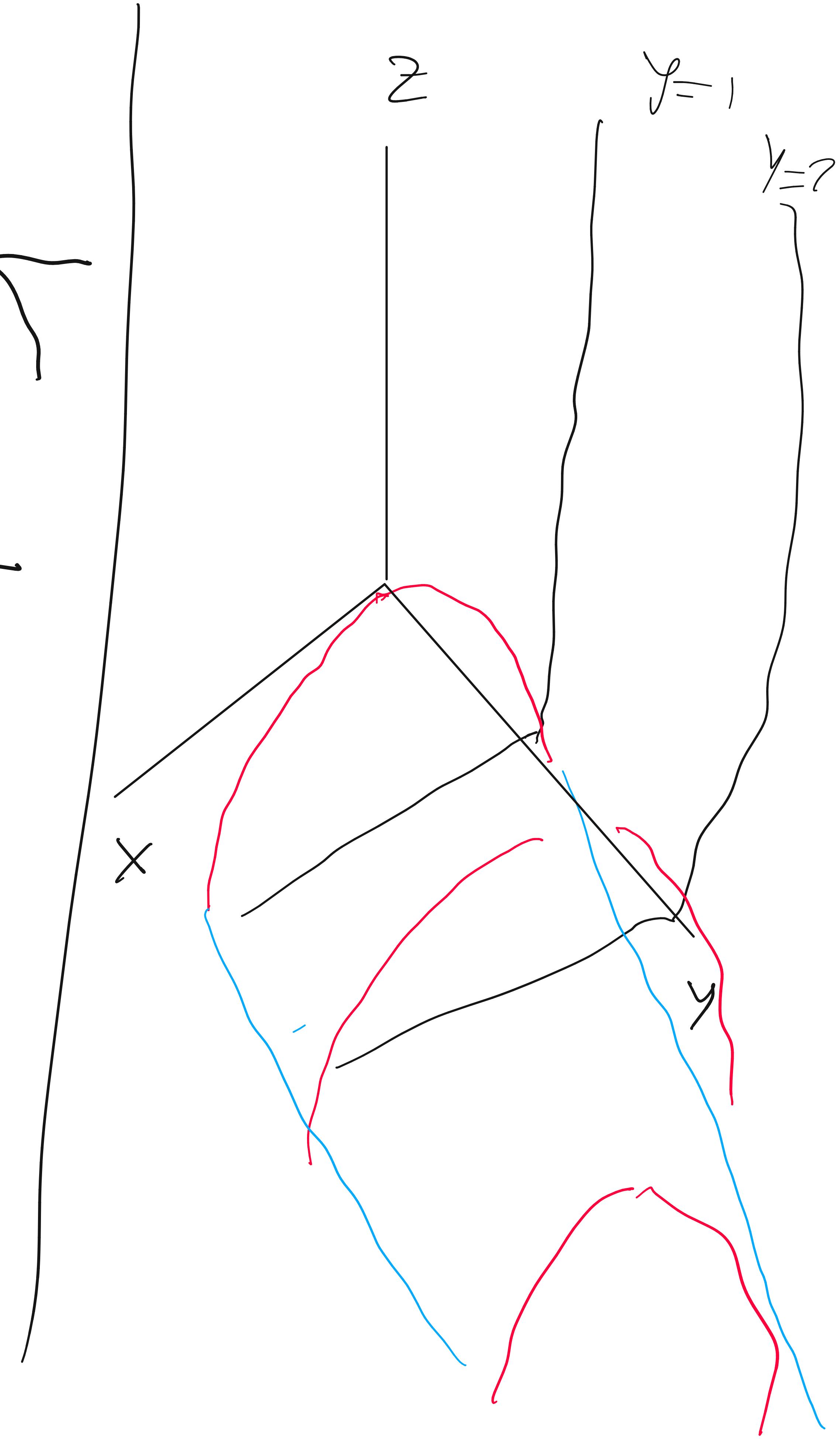


$y=1$ trace: $f(x,1) = 1-x^2$



$y=2$ trace $f(x,2) = 2-x^2$





Do activity 1!