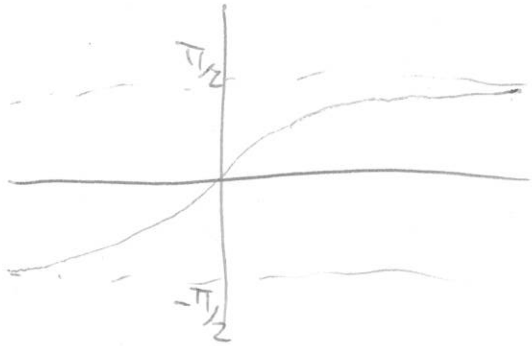
its inverse is called arctan

$\mathrm{dom}(\arctan) = \mathbb{R}$

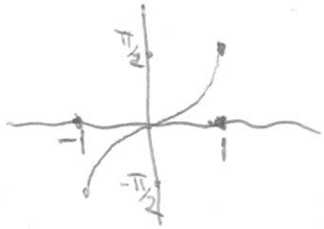
$\mathrm{ran}(\arctan) = (-\pi/2, \pi/2)$



$\theta = \arctan(y/x)$

but note $\tan(\theta+\pi) = \frac{-y}{-x} = \frac{y}{x}$

arcsin



arccos

<u>Warning:</u>

$\sin^{-1} x$ is often used to mean $\frac{1}{\sin x} \neq \arcsin x$

$\csc x = \mathrm{cosec}\, x = \frac{1}{\sin x}$

$\sec x = \frac{1}{\cos x}$

$\cot x = \frac{1}{\tan x}$

Limits

The notation

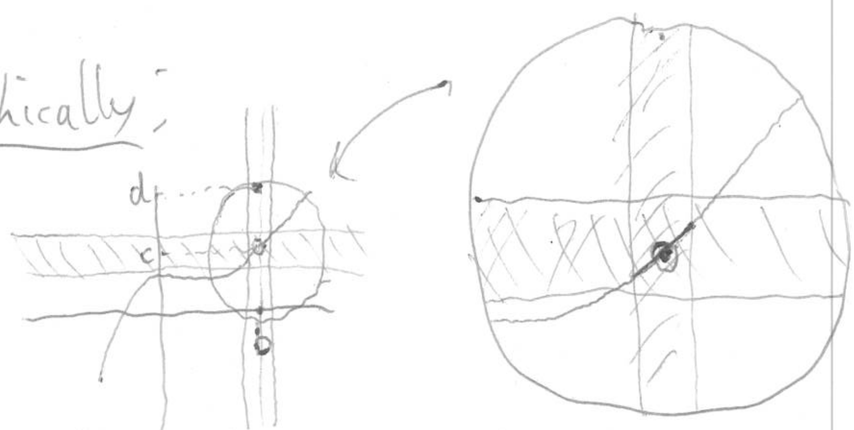
$$\lim_{x \to b} f(x) = c$$

b, c real numbers

f function

means: $f(x)$ is defined and arbitrarily close to c for all x sufficiently close to b, but not equal to b.

Graphically:

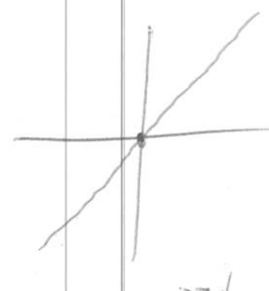


$\lim_{x \to b} f(x) = c$ This means:

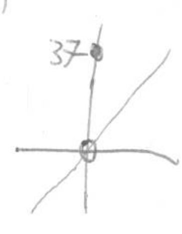
for any horizontal strip around c there is a vertical strip around b such that the graph of f within the vertical strip is entirely contained within the horizontal strip, except maybe above b itself.

Examples:

- $\lim_{x \to 0} x = 0$



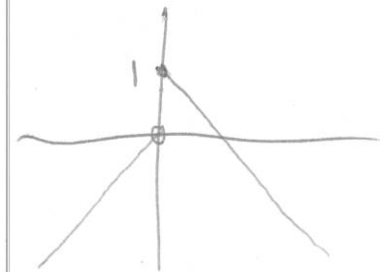
- $f(x) = x$ for $x \neq 0$ and $f(0) = 37$



$\operatorname{dom} f = \mathbb{R}$

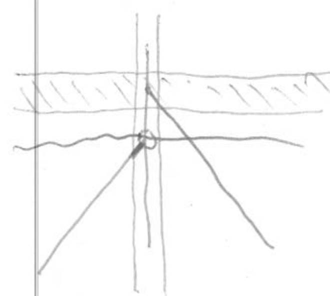
$$\lim_{x\to 0} f(x) = 0$$

· $f(x) = \begin{cases} x & \text{if } x < 0 \\ 1-x & \text{if } x \geq 0 \end{cases}$



$\lim_{x\to 0} f(x) \overset{?}{=} 0$ NO

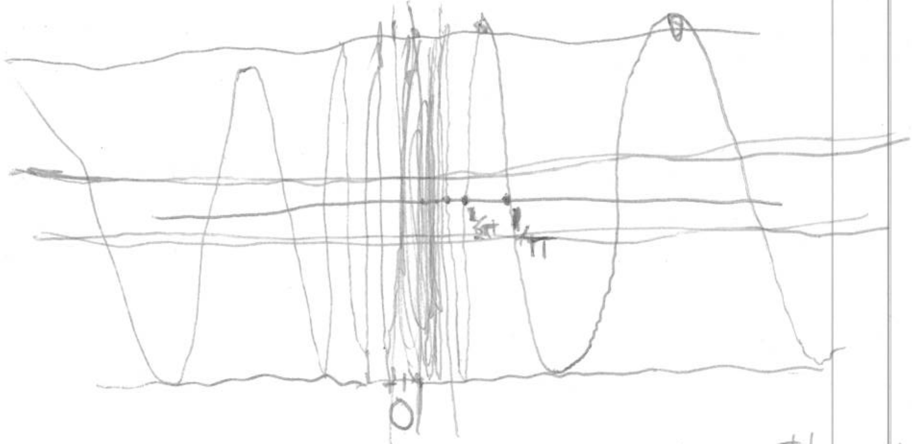
$\lim_{x\to 0} f(x) \overset{?}{=} 1$ NO



<u>No limit</u> at 0

· $f(x) = \sin(1/x)$

$\lim_{x\to 0} f(x)$ No limit

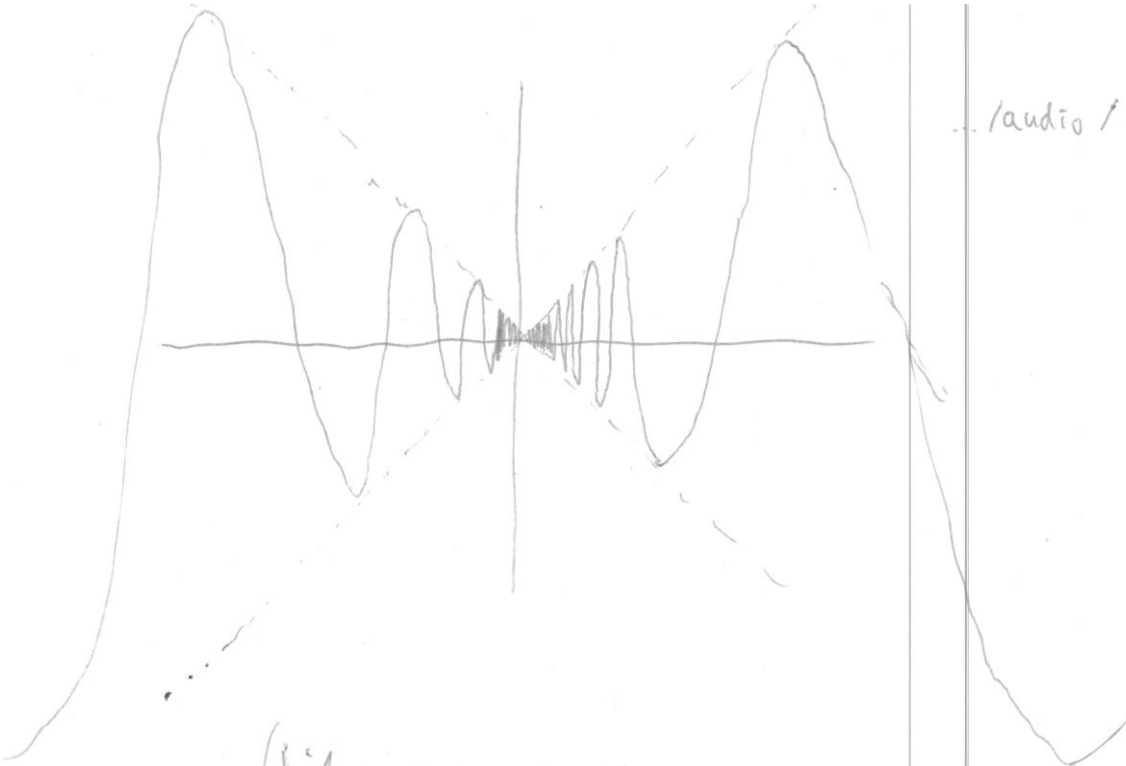


$$\sin\left(\frac{1}{(1/k\pi)}\right) = \sin k\pi = 0$$

www.math.mcmaster.ca/~mbays/teaching/1za3/audio/sininv.wav

· $f(x) = x\sin(1/x)$

../audio/xsininv.wav



~~lim f(x)~~ $\lim_{x \to 0} f(x) = 0$

http:// ~~mbays~~ www.mcmaster.ca/~mbays