

Recall Plugging in x 's to

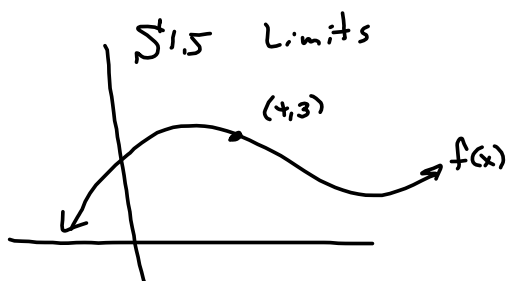
$$m_{sec} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

Used Desmos

$$f(x) = \frac{2}{6-x}$$

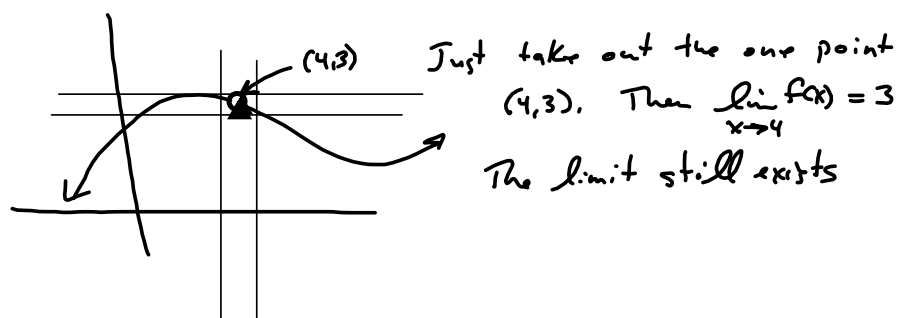
The point on the graph was $(7, -2)$

$$m(x) = \frac{f(x) - f(7)}{x - 7}$$



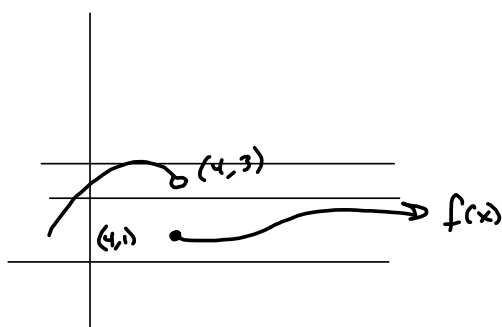
$\lim_{x \rightarrow 4} f(x) = 3$, because I can make $f(x)$ as close to 3 as I want, by taking x sufficiently close to 4.

$\lim_{x \rightarrow c} f(x) = L$ means I can make $f(x)$ arbitrarily close to L by choosing x sufficiently close to c , except $x = c$, itself.

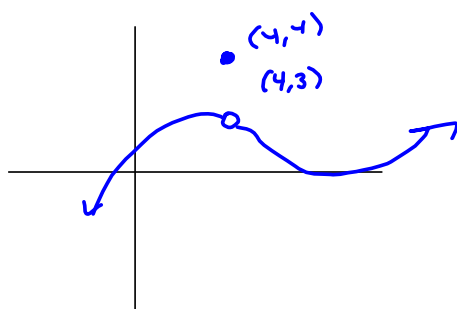


$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$\begin{aligned} & \lim_{h \rightarrow 0} \frac{f(4+h) - f(4)}{h} \\ &= \lim_{h \rightarrow 0} \frac{f(4+h) - 3}{h} \end{aligned}$$



$\lim_{x \rightarrow 4} f(x)$ Does not exist
DNE
~~A~~



$$\lim_{x \rightarrow 4} f(x) = 3$$

Limit exists!

But $\lim_{x \rightarrow 4} f(x) = 3 \neq 4 = f(4)$

$$\lim_{x \rightarrow c} f(x) = L \neq f(c)$$

Limit exists, but not same as $f(c)$ itself!

continuous = cont^d

f is cont^d at $x=c$ if $\lim_{x \rightarrow c} f(x) = f(c)$.

Weird stuff.

Weird stuff.

$$f(x) = \sin\left(\frac{1}{x}\right)$$

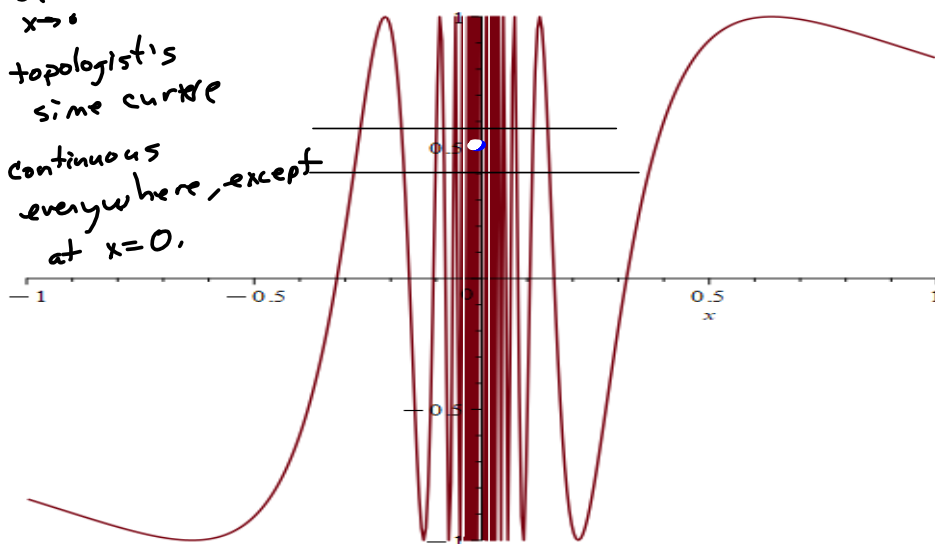
$$\lim_{x \rightarrow 0} \sin\left(\frac{1}{x}\right)$$



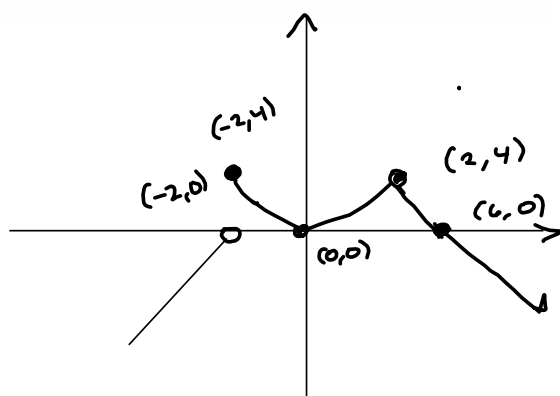
$$\lim_{x \rightarrow 0} \sin\left(\frac{1}{x}\right) \nexists$$

topologist's
sine curve

continuous
everywhere, except
at $x=0$.



$$\text{Let } f(x) = \begin{cases} 2 + x & \text{if } x < -2 \\ x^2 & \text{if } -2 \leq x < 2 \\ 6 - x & \text{if } x \geq 2 \end{cases}$$

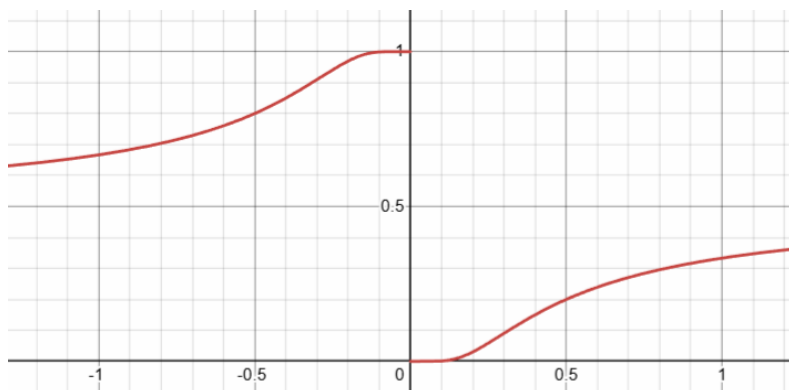


Suture points @ $x = -2, x = 2$

$$-x + 6$$

$$-2 + 6 = 4$$

Key points labeled w/
ordered pairs
"OPL"



$$f(x) = \frac{2}{1+2^x}$$

$$f(-.1)$$

$$= 0.999024390244$$

$$f(-.01)$$

$$= 1$$

$$f(-.001)$$

$$= 1$$

$$\lim_{x \rightarrow 0^-} f(x) = 1$$

$$f(.1)$$

$$= 0.000975609756098$$

$$f(.01)$$

$$= 7.8886090522 \times 10^{-31}$$

$$f(.001)$$

$$= 9.332636185 \times 10^{-302}$$

Numerical
Investigation
(Brute force, sort of).

$$\lim_{x \rightarrow 0^+} f(x) = 1$$

Attachments

260121.jpg

260121-excel.xlsx