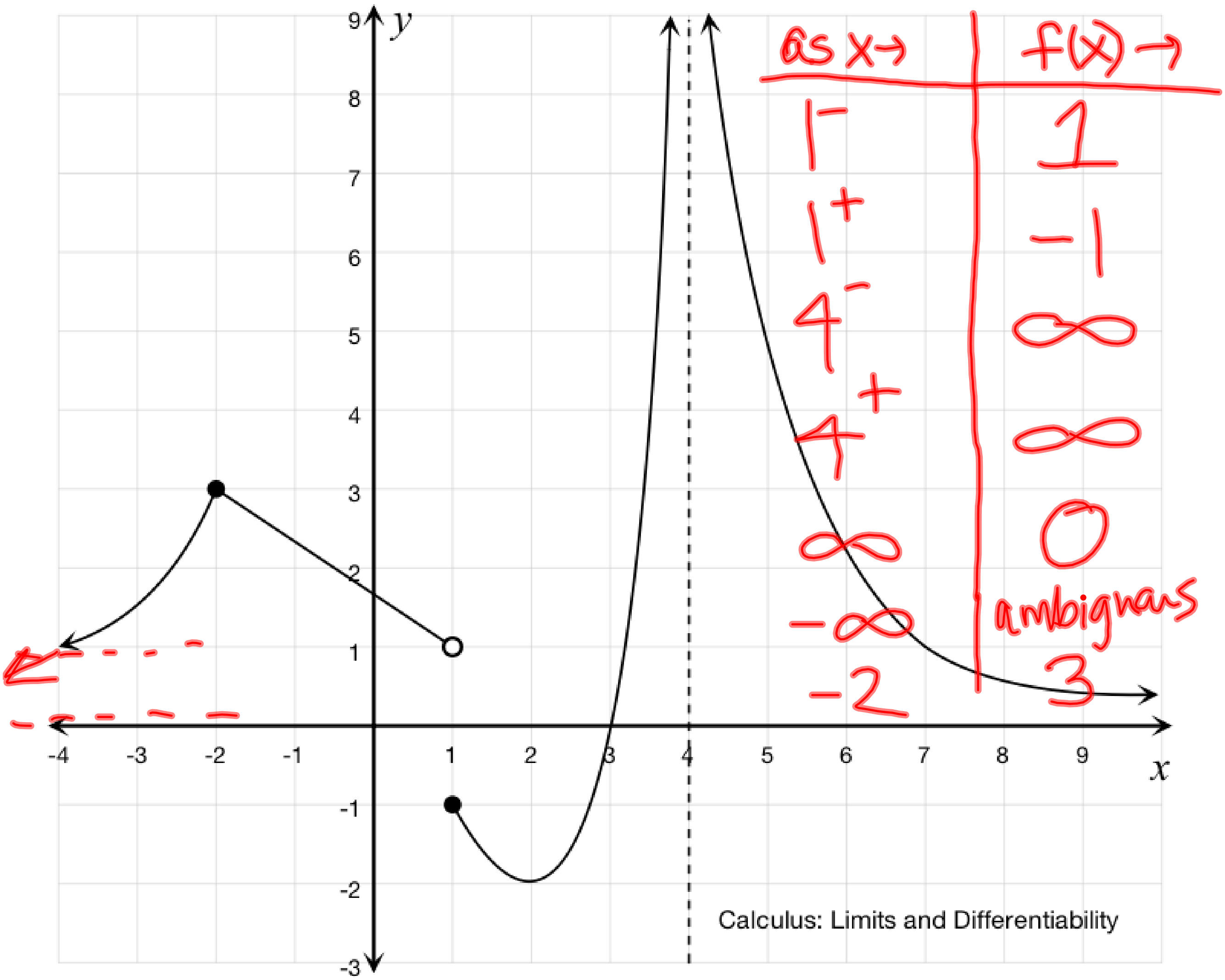


as $x \to$	$f(x) \to$
1^-	1
1^+	-1
4^-	∞
4^+	∞
∞	0
$-\infty$	ambiguous
-2	3

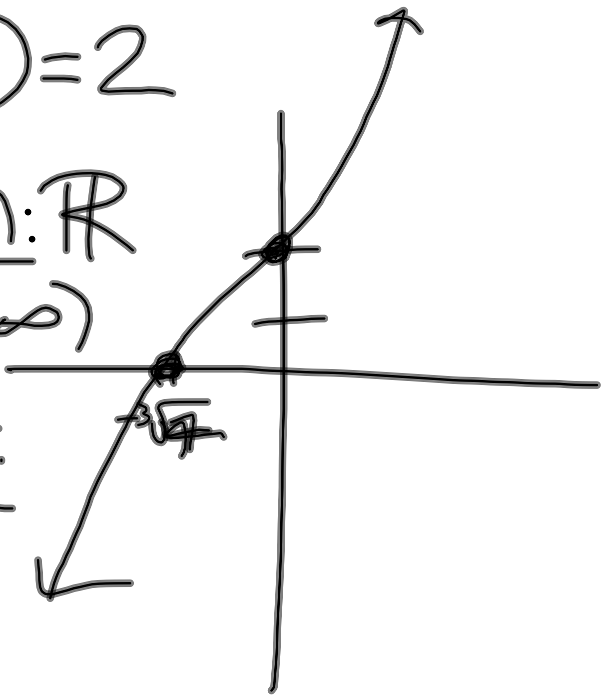
24. $f(x) = \frac{1}{2}x^3 + 2$

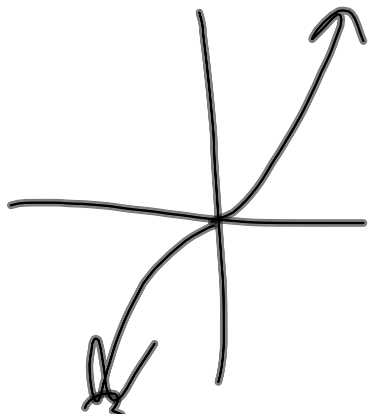
$f(0) = 2$

domain: $\mathbb{R}$

$(-\infty, \infty)$

range: $\mathbb{R}$





$\frac{1}{2}x^3 + 2 = 0$

$\frac{1}{2}x^3 = -2$

$x^3 = -4$

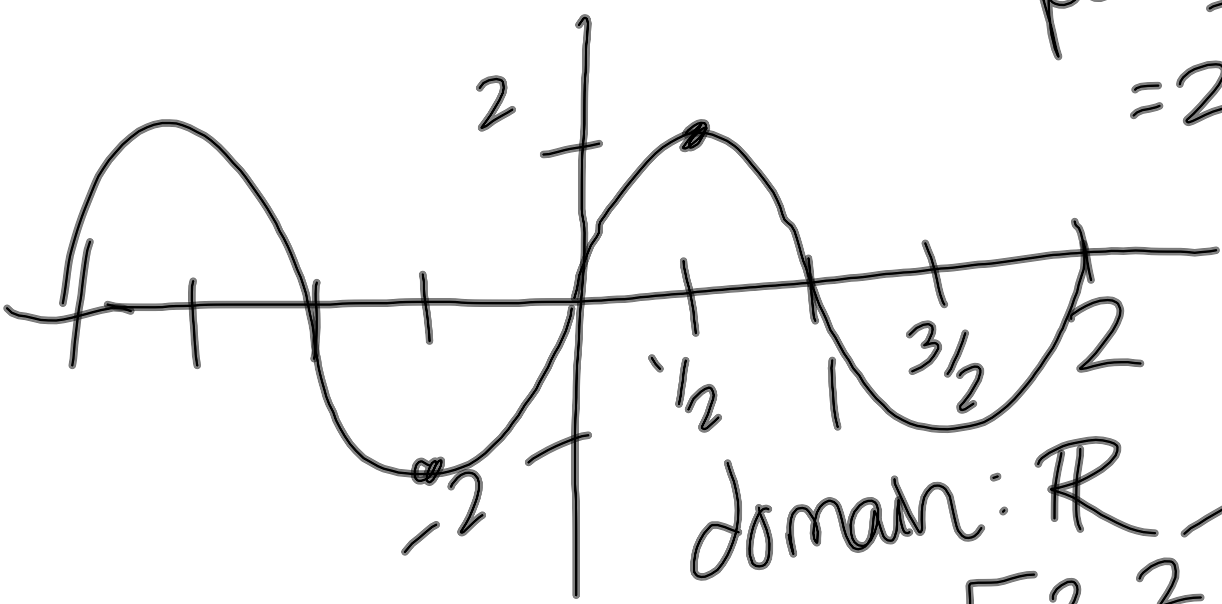
$x = \sqrt[3]{-4}$

27. $g(t) = 2\sin \pi t$

amp: 2

per: $\frac{2\pi}{\pi}$

$= 2$



domain: $\mathbb{R}$

range: $[-2, 2]$

18. $f(x) = \begin{cases} x^2+2, & x \le 1 \\ 2x^2+2, & x > 1 \end{cases}$

(a) $f(-2) = (-2)^2+2 = 6$

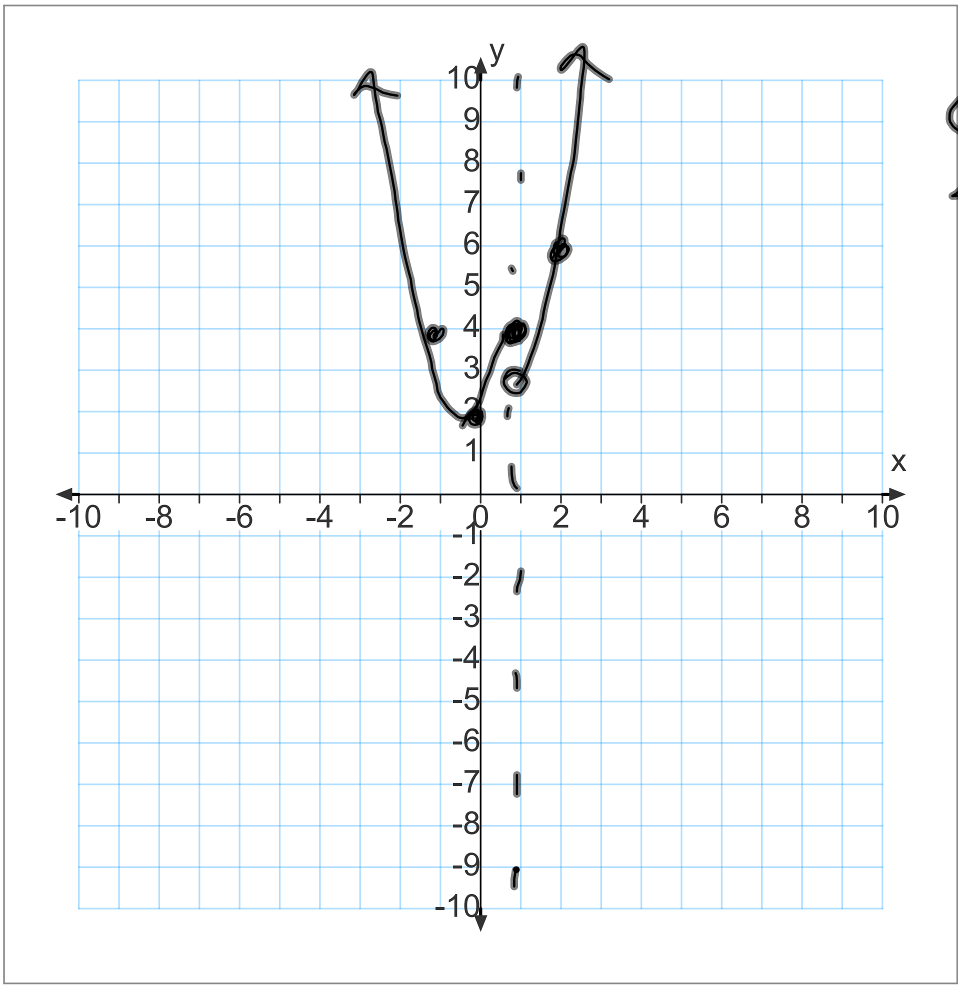
domain: $\mathbb{R}$

range: $[2, \infty)$

(b) $f(0) = 0^2+2 = 2$

(c) $f(1) = 1^2+2 = 3$

(d) $f(s^2+2) = 2(s^2+2)^2+2 = 2(s^4+4s^2+4)+2$
$= 2s^4+8s^2+10$



$$\begin{cases} 2x^2+2, & x \le 1 \\ x^2+2, & x > 1 \end{cases}$$

Δx "delta x"

change in x

$$f(x+\Delta x)$$

$$\frac{f(x+\overset{\Delta x}{h})-f(x)}{\underset{\Delta x}{h}}$$

1.2

$$f(x) = \frac{x-2}{x^2-4}, \quad x \neq 2, -2$$

what happens to $f(x)$ as x approaches 2?

x	1.9	1.99	1.999	2	2.001	2.1
$f(x)$	0.2564	0.2506	0.2501	?	0.2499	0.2439

$f(x) \to 0.25$ as $x \to 2$.

Informal Decription of the Limit

If $f(x)$ becomes arbitrarily close to a single number L as x approaches c from either side, the limit of $f(x)$, as x appoaches c, is L.

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

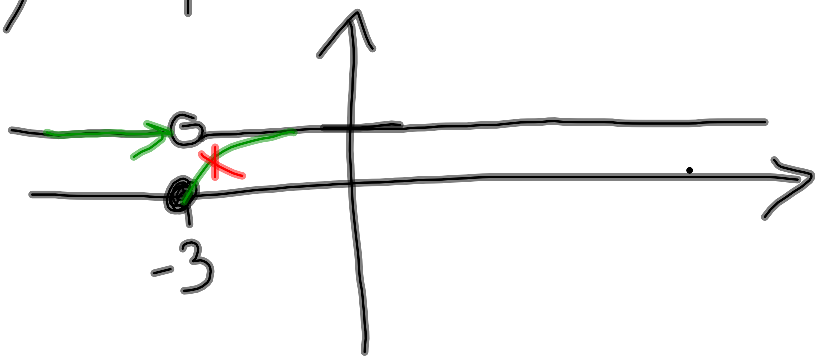
Note: the existence or nonexistence of $f(x)$ at $x=c$ has no bearing on the existence of the limit as $x \to c$.

$$\lim_{x \to -3} \frac{\sqrt{1-x}-2}{x+3} = -0.25$$

$$f(x) = \begin{cases} 1, & x \neq -3 \\ 0, & x = -3 \end{cases}$$

$f(-3) = 0$

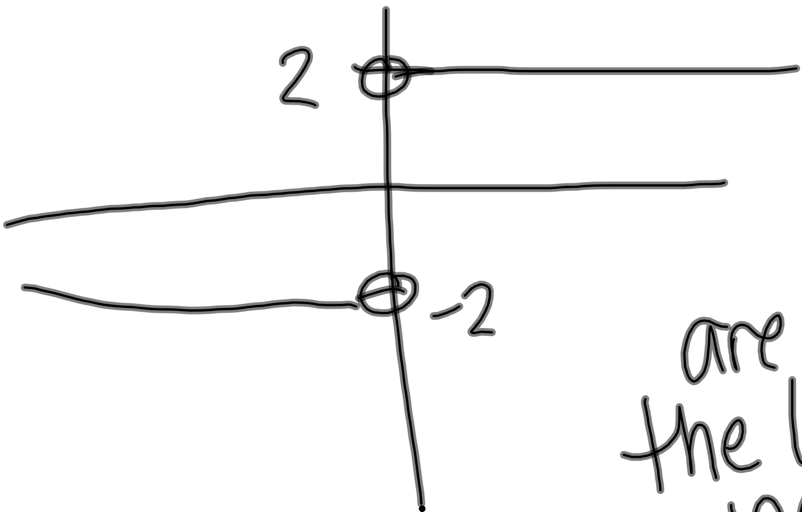
$$\lim_{x \to -3} f(x) = 1$$



$$\lim_{x \to 0} \frac{|2x|}{x}$$

$$|x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$

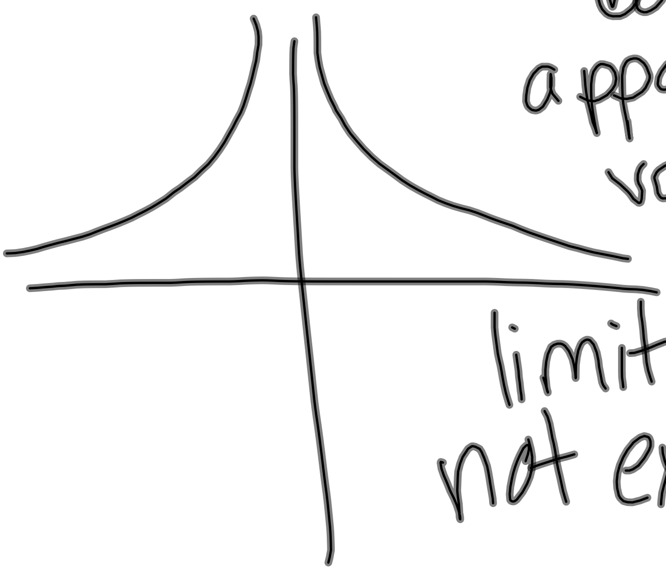
$$\frac{|2x|}{x} = \begin{cases} \frac{2x}{x} = 2, & x > 0 \\ \frac{-2x}{x} = -2, & x < 0 \end{cases}$$



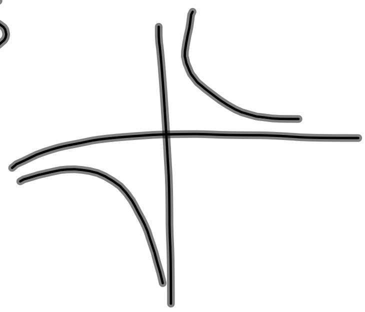
since right & left limits are different, the limit does not exist.

$$\lim_{x \to 0} \frac{1}{x^4}$$

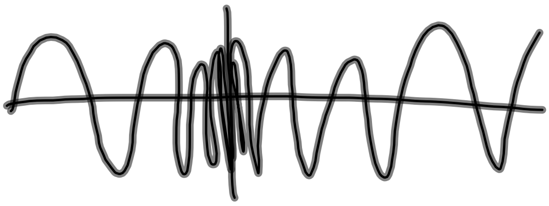
because f(x) increases without bound (does not appoach a finite value), $\frac{1}{x^{odd}}$



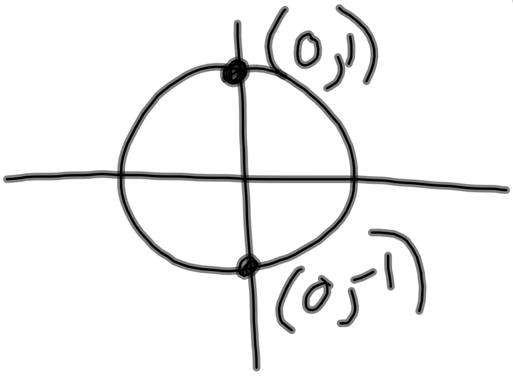
limit does not exist.



$$\lim_{x\to 0} \sin\frac{1}{x}$$



x	$\frac{2}{\pi}$	$\frac{2}{3\pi}$	$\frac{2}{5\pi}$	$\frac{2}{7\pi}$	$\frac{2}{9\pi}$	$\frac{2}{11\pi}$
$\sin\frac{1}{x}$	1	-1	1	-1	1	-1

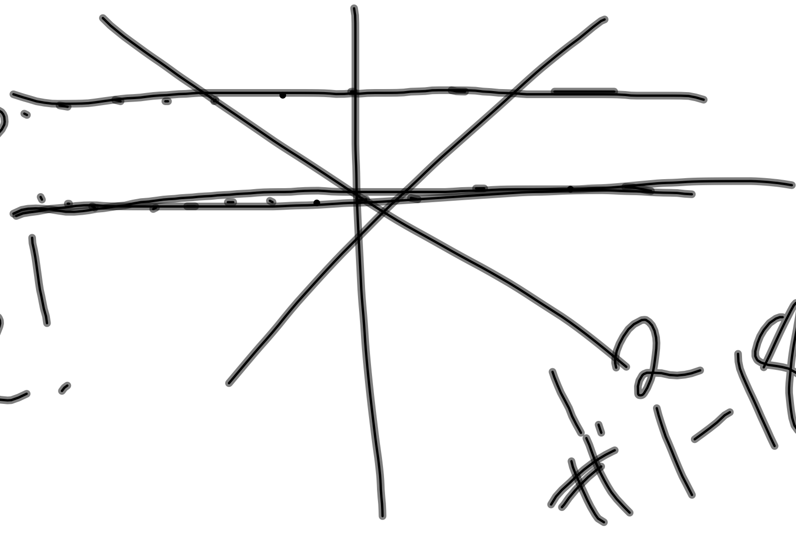


limit does not exist as $x\to 0$ b/c function oscillates

"Dirichlet Function"

$$f(x) = \begin{cases} 0, & \text{if } x \text{ is rational} \\ 1, & \text{if } x \text{ is irrational} \end{cases}$$

limit does not exist anywhere!



$\frac{1}{2}$ #1-18