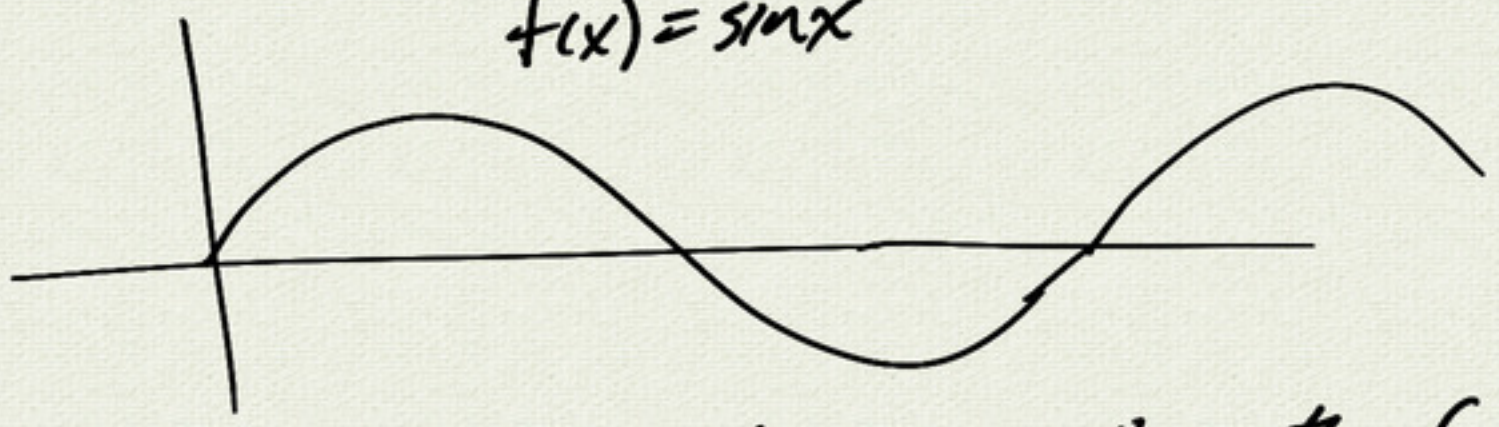
4.1 Function Properties

domain/range

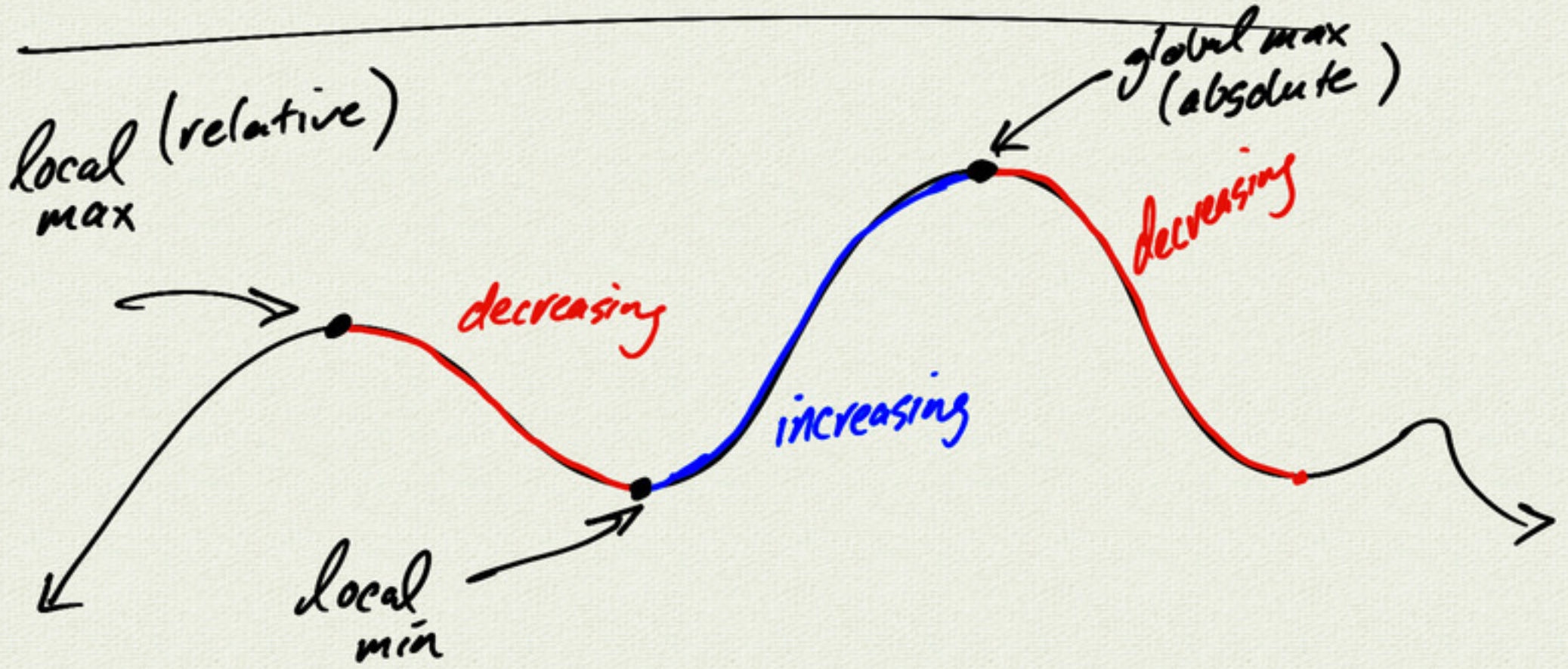


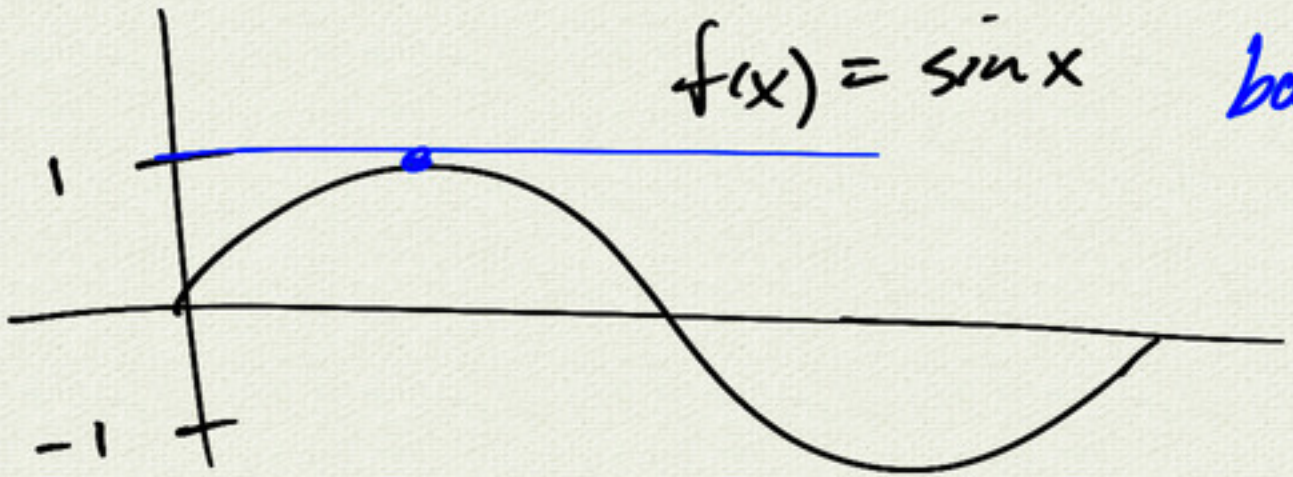
domain: $\mathbb{R}$

domain = where the function is defined

range: $[-1, 1]$

range = set of all possible function values



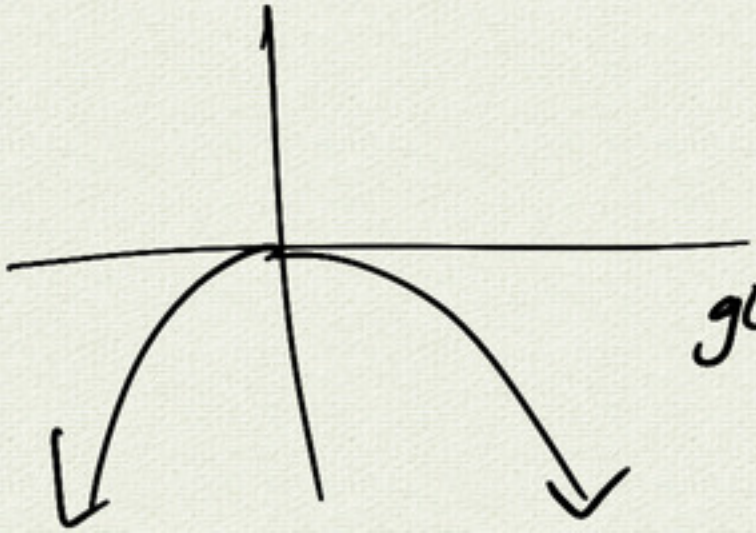


$f(x) = \sin x$

bounded above

bounded below

bounded : both above and below

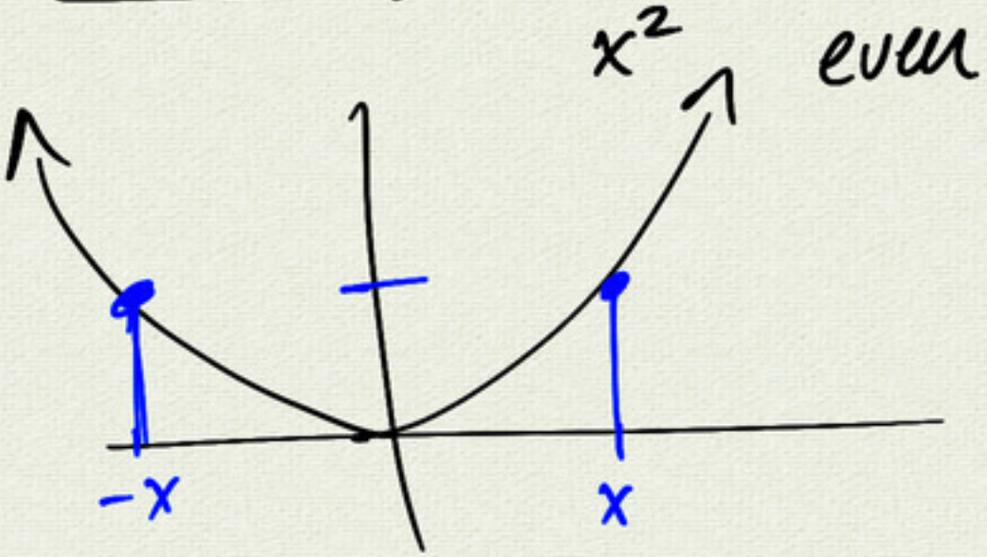


$g(x) = -x^2$

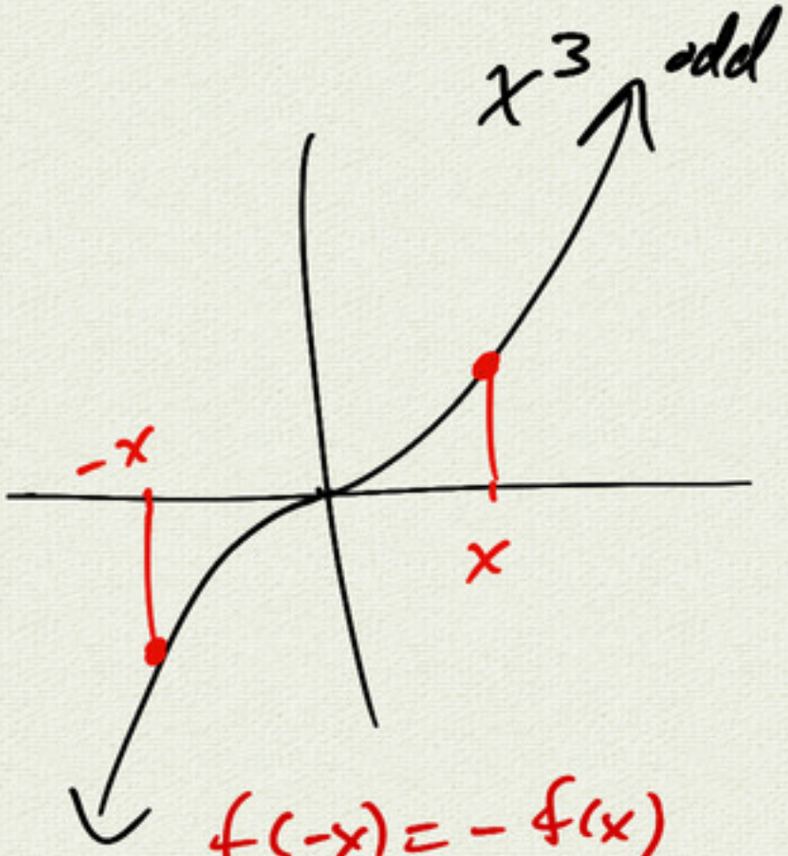
bounded above, but not below

(no lower bound)

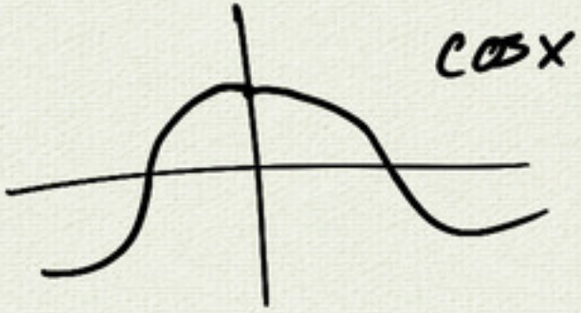
odd/even symmetry

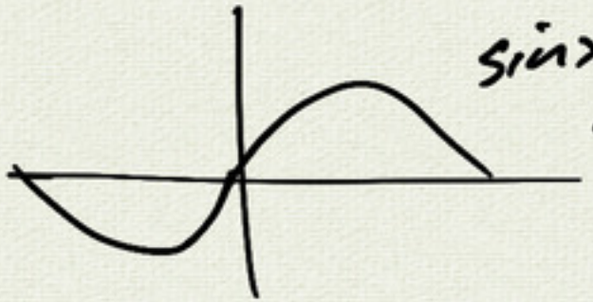


$f(-x) = f(x)$



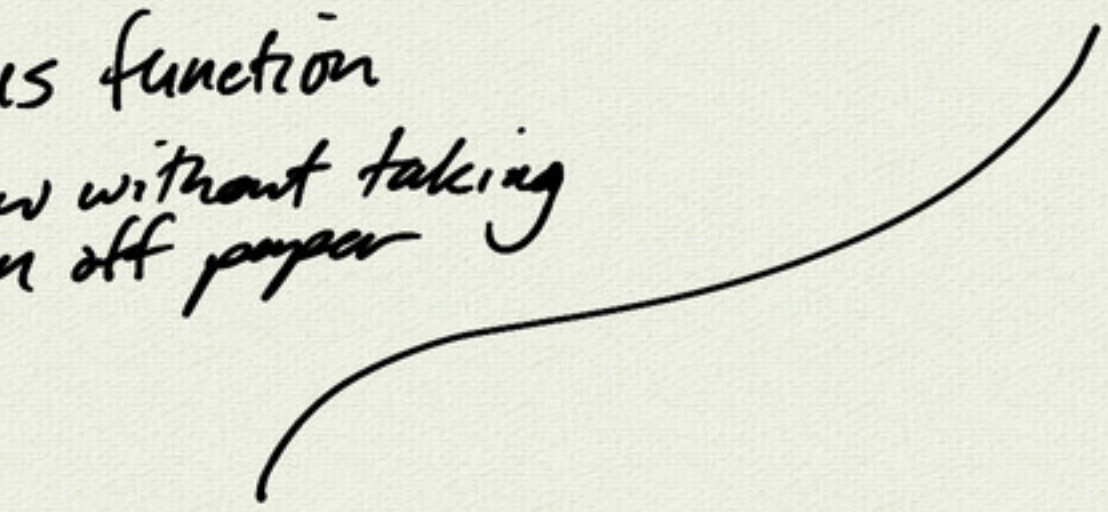
$f(-x) = -f(x)$

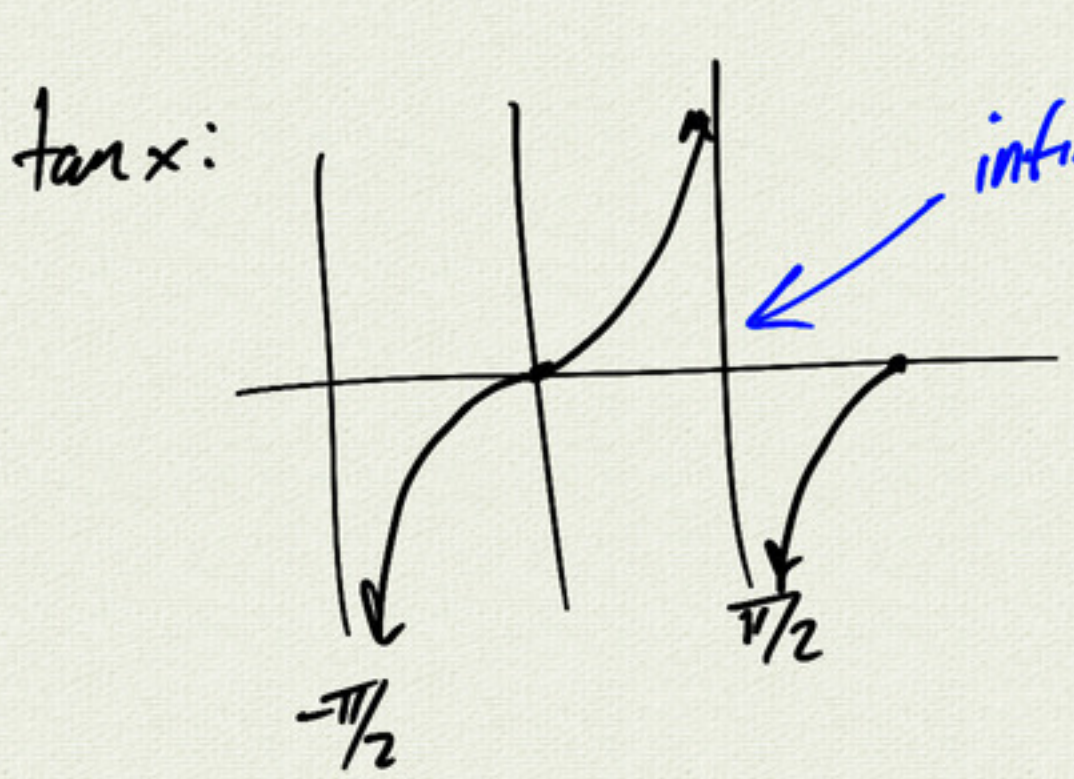




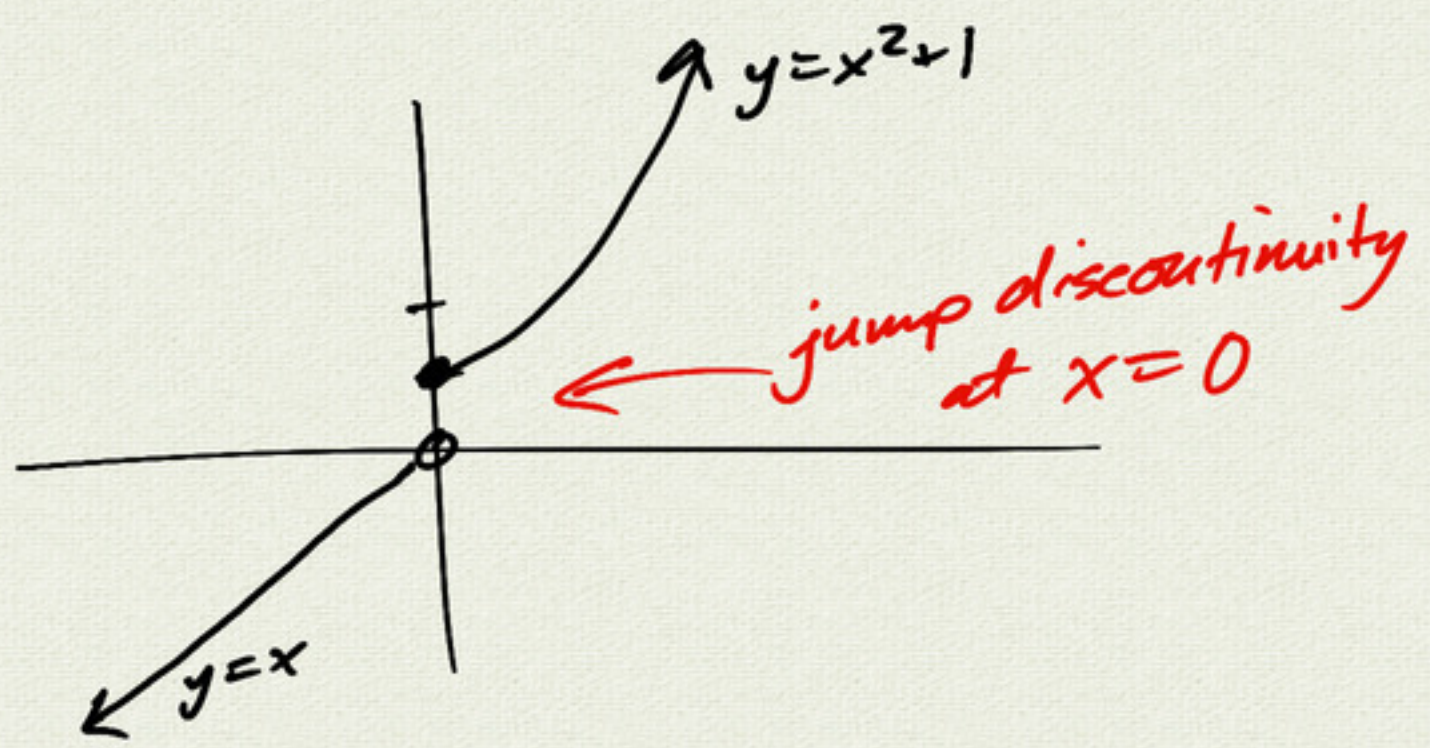
discontinuities

continuous function
- draw without taking pen off paper

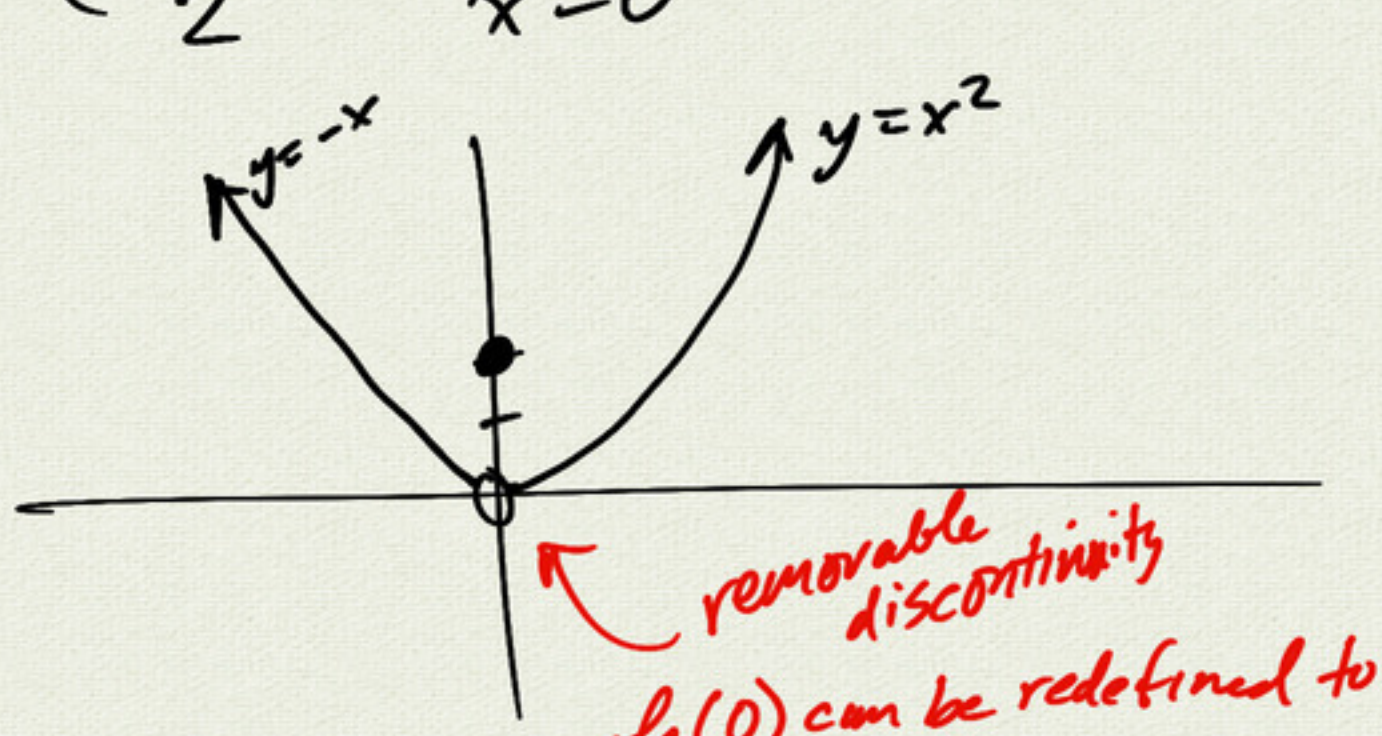




let $g(x) = \begin{cases} x & x<0 \\ x^2+1 & x \geq 0 \end{cases}$ piecewise function



let $h(x) = \begin{cases} -x & x<0 \\ x^2 & x>0 \\ 2 & x=0 \end{cases}$



$\text{int}(x)$ greatest integer function

(the biggest integer $\leq x$)

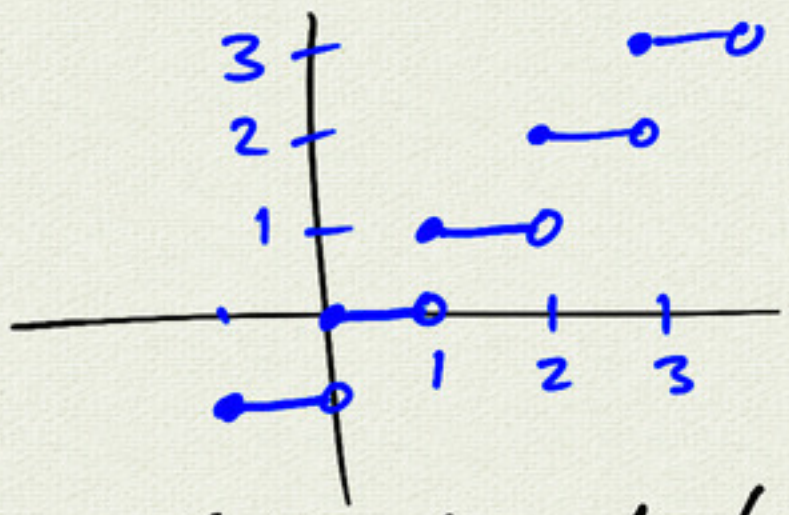
$\text{int}(0) = 0$

$\text{int}(.1) = 0$

$\text{int}(.5) = 0$

$\text{int}(.9) = 0$

$\text{int}(1) = 1$



step function

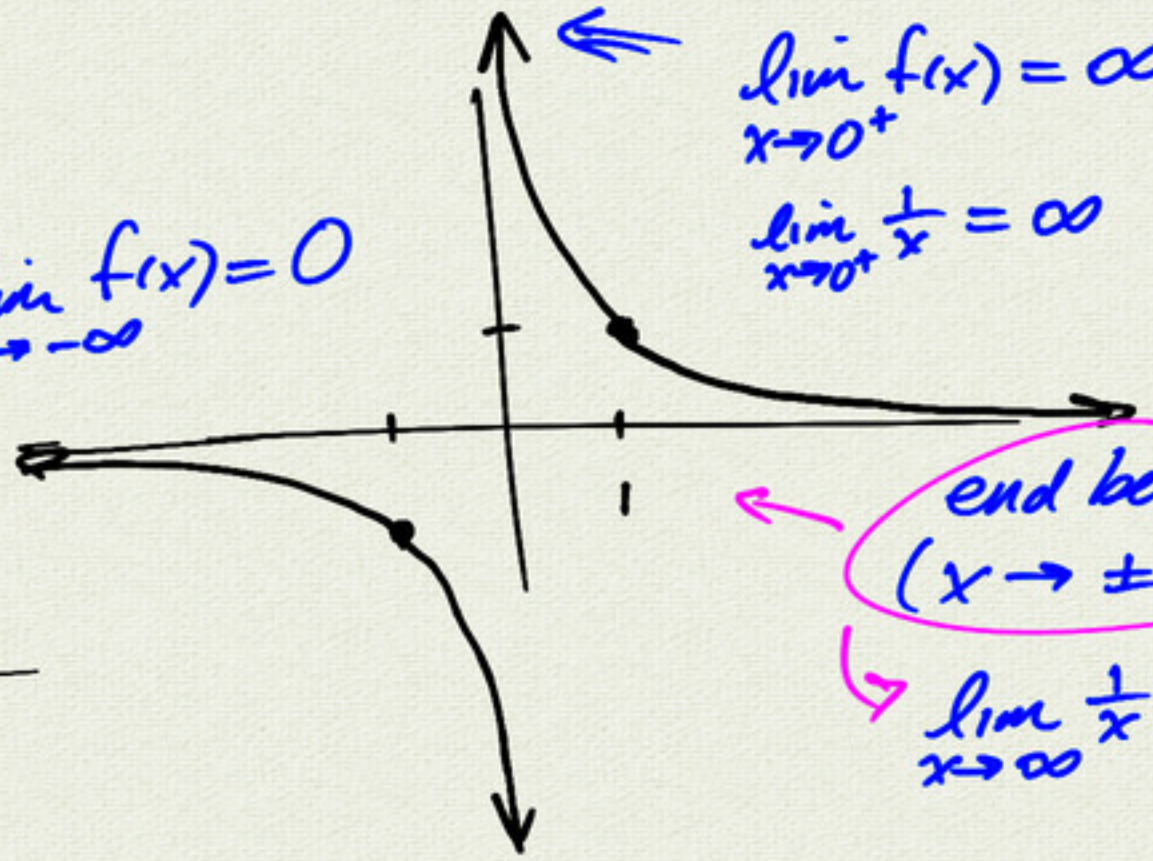
jump discontinuity at $x = k$ $(k \in \mathbb{Z})$

domain $= \mathbb{R}$

range $= \mathbb{Z}$

$f(x) = \frac{1}{x}$

x	$1/x$
1	1
10	.1
100	.01
1000	.001
.1	10
.01	100
.001	1000



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

$\lim_{x \to 0^+} \frac{1}{x} = \infty$

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

end behavior

$(x \to \pm\infty)$

$\lim_{x \to \infty} \frac{1}{x} = 0$

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