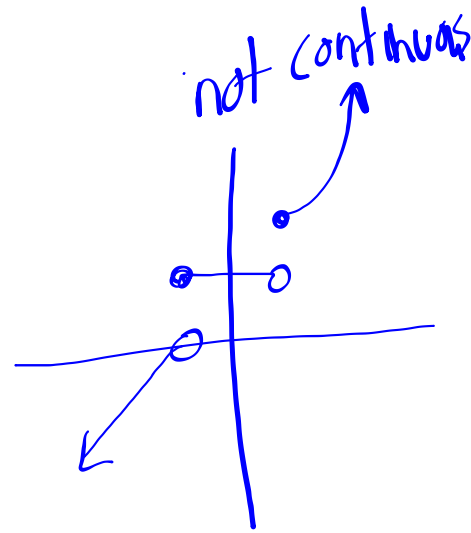
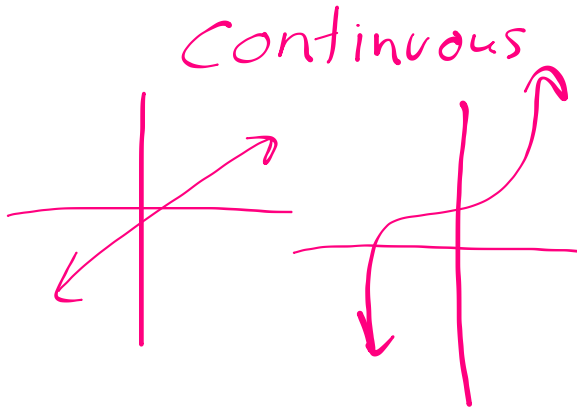


2.3 Continuity

How would you describe Continuity?



Aug 2-9:25 PM

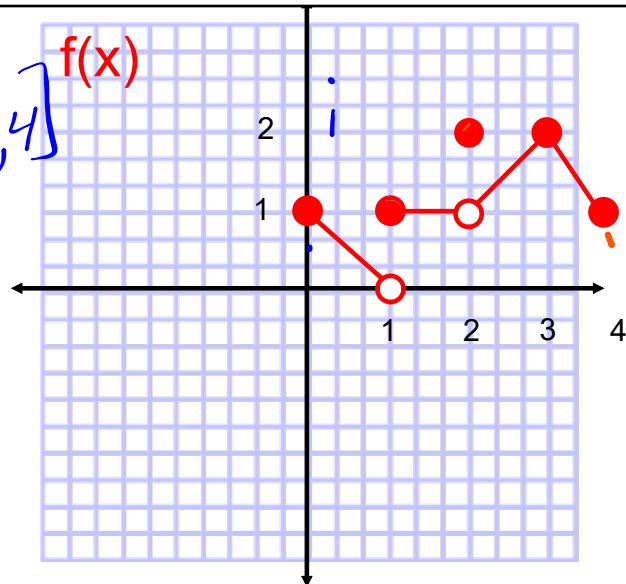
Where is $f(x)$ continuous?

[0, 1) ∪ (1, 2) ∪ (2, 4]

For what values of c does

$\lim_{x \rightarrow c} f(x)$ exist?

(0, 1) ∪ (1, 4)



Where is the function discontinuous?

Sep 2-8:17 AM

Continuity at a point: (RS #23)

$f(x)$ is continuous at $x = c$ if

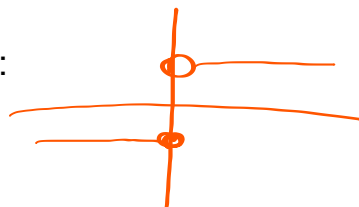
1. $f(c)$ exists function value exists
2. $\lim_{x \rightarrow c} f(x)$ exists (remember this means left hand = right hand)
3. $\lim_{x \rightarrow c} f(x) = f(c)$ lim = func val

End point continuity:

Sep 2-8:19 AM

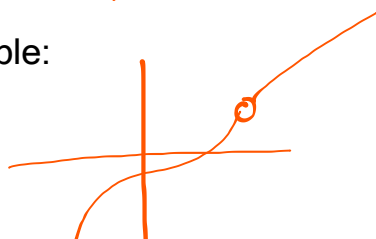
3 types of discontinuities

1. jump:



2. removable:

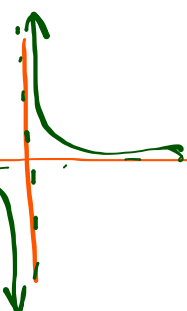
(holes)



3. infinite:

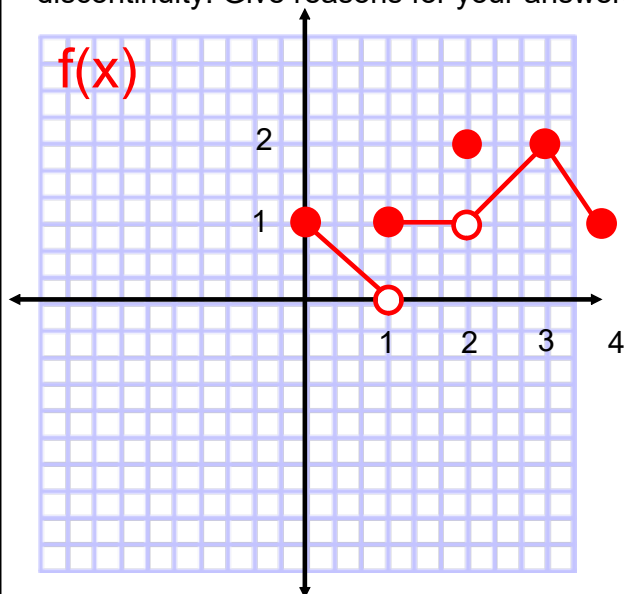
vertical

asymptotes



Sep 2-8:18 AM

Find the values of x where the graph is not continuous. Identify the type of discontinuity. Give reasons for your answers. (Use the continuity definition to justify)

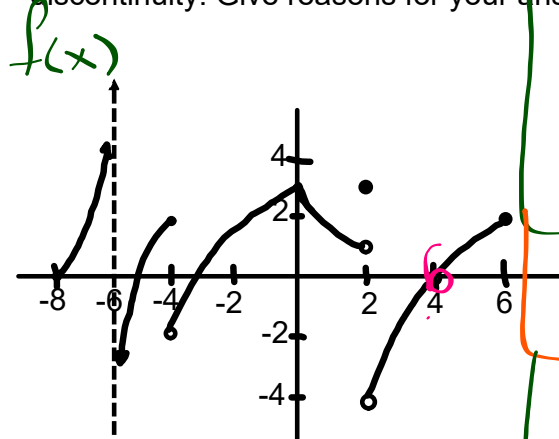


val	type	reason
$x=1$	jump	$\lim_{x \rightarrow 1} f(x)$ DNE $\lim_{x \rightarrow 1^-} f(x) \neq f(1)$

$x=2$	removable	$f(2) = 2$ $\lim_{x \rightarrow 2} f(x) = 1$ $f(2) \neq \lim$
-------	-----------	---------------------------------------------------------------------

Aug 31-4:25 PM

Find the values of x where the graph is not continuous. Identify the type of discontinuity. Give reasons for your answers. (Use the continuity definition to justify)



$x=-6$	inf	$f(-6)$ DNE $\lim_{x \rightarrow -6} f(x)$ DNE $f(-6) \neq \lim$
--------	-----	------------------------------------------------------------------------

$x=-4$	jump	$\lim_{x \rightarrow -4} f(x)$ DNE $f(-4) \neq \lim$
--------	------	---------------------------------------------------------

$x=2$	J, R	$\lim_{x \rightarrow 2} f(x)$ DNE Rule 3
-------	------	---------------------------------------------

$x=4$	rem	$f(4)$ DNE
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Aug 2-10:14 PM

Extended function-

$$f(x) = \frac{x^2 - 9}{x + 3} = \frac{(x+3)(x-3)}{(x+3)}$$

hole at $x = -3$

* find y-val of hole $x = -3 \rightarrow (-3) - 3 = -6$

So hole at $(-3, -6)$

$$\left\{ \begin{array}{l} \frac{x^2 - 9}{x + 3}, x \neq -3 \\ -6, x = -3 \end{array} \right.$$

Continuous function-

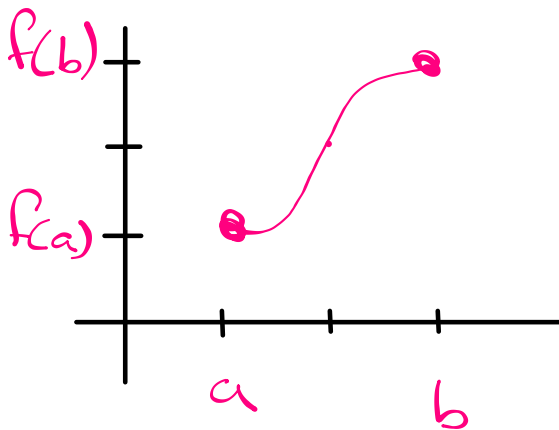
*

Compositions of continuous functions are continuous.

*

Aug 2-10:32 PM

Intermediate Value Theorem (IVT) A func that is continuous on $[a, b]$ takes every output value between $f(a)$ and $f(b)$.



Aug 2-10:37 PM