2.3 day 1 — Continuity

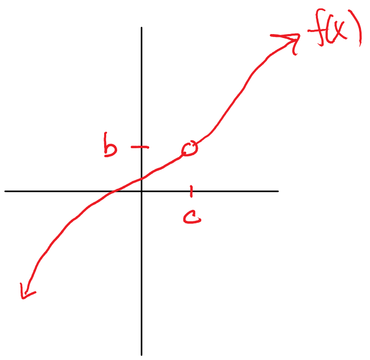
Wednesday, August 23, 2017 9:28 AM

A function is continuous at an interior point (c, b) iff $\lim_{x \to c} f(x) = f(c) = b$

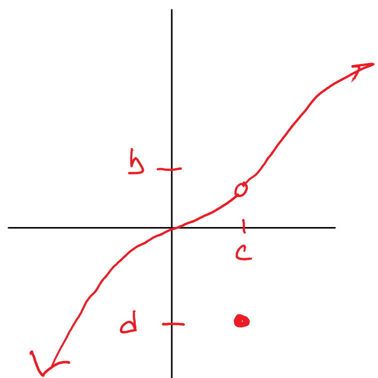
Recall $\lim_{x \to c^-} f(x) = \lim_{x \to c^+} f(x)$

Types of discontinuity:

Removable



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

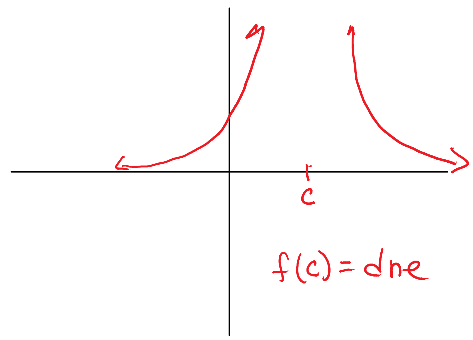


$\lim_{x \to c} f(x) = b$

$f(c) = d$

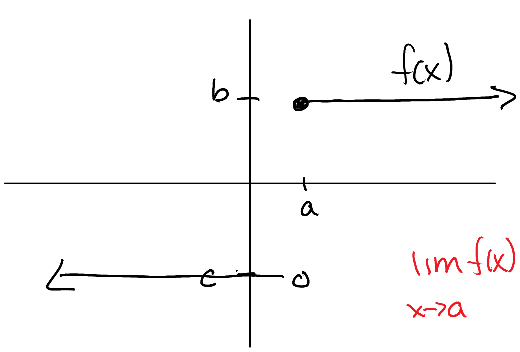
$\lim_{x \to c} f(x) \neq f(c)$

Infinite:



$f(c) = \text{dne}$

Jump:

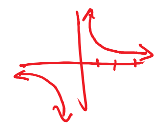


$\lim_{x \to a} f(x) = \text{dne}$

A function is continuous on an interval iff it is continuous at every point on the interval.

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

ex: Is $f(x)$ continuous on $(0,3)$?



yes

A continuous function is one that is continuous @ every point on its domain. $f(x) = \frac{1}{x}$ D: $(-\infty,0)\cup(0,\infty)$

ex: Is $f(x)$ a continuous function?

extended function:

$$f(x) = \frac{x^2-4}{x+2}$$

Is $f(x)$ continuous over the set of real numbers?

NO!

create an extended function:

$$g(x) = \frac{(x-2)\cancel{(x+2)}}{\cancel{(x+2)}} \qquad g(x) = x-2$$

$g(2) = 2-2 = 0$

$$h(x) = \begin{cases} \frac{x^2-4}{x+2} & x \neq \underline{\cancel{-}2} \\ \underline{0} & x = \underline{\cancel{-}2} \end{cases}$$

make $h(x)$ continuous over $\mathbb{R}$.

Find the value for b that will make $h(x)$ continuous at $x=1$.

$$h(x) = \begin{cases} bx^2 - 1, & x < 1 \quad LH \\ x, & x \geq 1 \quad RH \end{cases}$$

$bx^2 - 1 = x$

$b(1)^2 - 1 = 1$

$b - 1 = 1$

$\boxed{b = 2}$