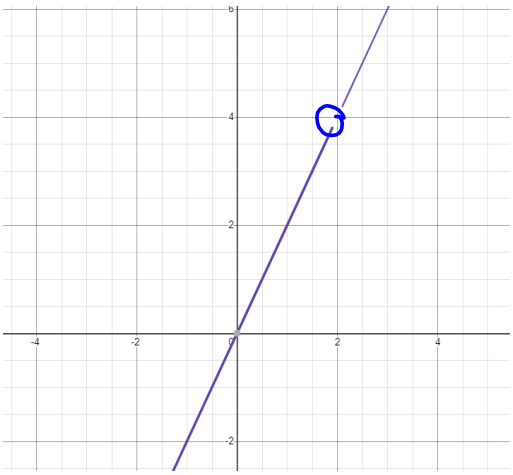
LIMITS - GRAPHICALLY

The limit of a fuction is a very important concept in calculus.

Ex.1

$f(x)=2x \quad x\neq 2$



x	f(x)
1.9	3.8
1.99	3.98
1.999	3.998
2.0	4 ←
2.001	4.002
2.01	4.02
2.1	4.2

$\lim_{x\to 2^-} f(x)=4$

$\lim_{x\to 2^+} f(x)=4$

$\rightarrow \lim_{x\to 2} f(x)=4$

$f(2)$ DNE

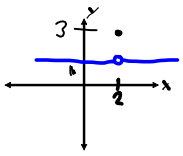
Does not exist

Let's look at limits graphically.

Ex.2

Graph $\frac{(x-2)}{(x-2)} = 1 \quad x \neq 2$

$f(x) = \begin{cases} \frac{x-2}{x-2} & x \neq 2 \\ 3 & x = 2 \end{cases}$



$\lim_{x \to 2^-} f(x) = 1$, $\lim_{x \to 2^+} f(x) = 1$ $\Rightarrow \lim_{x \to 2} f(x) = 1$ $\quad f(2) = 3$

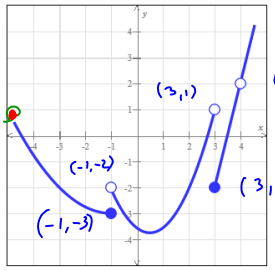
A limit exists iff the left hand limit and the right hand limit exist and they are both equal.

$\lim_{x \to a} f(x)$ IFF $\lim_{x \to a^+} f(x) = \lim_{x \to a^-} f(x)$

Ex.3

The function f(x) is defined below. Find the following

a) $\lim_{x \to -1^+} f(x)$ b) $\lim_{x \to -1^-} f(x)$ c) $\lim_{x \to -1} f(x)$



a) $\lim_{x \to -1^+} f(x) = -2$

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

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

$\lim_{x \to -5^-} f(x) = 1$

$\lim_{x \to -5^+} f(x) = 1$

$\lim_{x \to -5^-} f(x)$ DNE

TRY

Using the above find

a) $\lim_{x \to 3^+} f(x) = -2$ b) $\lim_{x \to 3^-} f(x) = 1$ c) $\lim_{x \to 3} f(x)$ DNE

d) $\lim_{x \to 4^+} f(x) = 2$ e) $\lim_{x \to 4^-} f(x) = 2$ f) $\lim_{x \to 4} f(x) = 2$

$f(2) =$ DNE

Mar 19-11:24 AM