Limits

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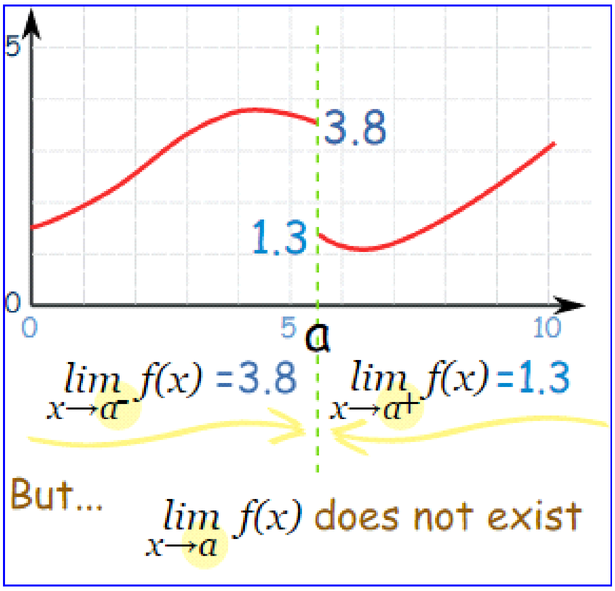
When we call the Limit "L", and the value that x gets close to "a" we can say

"f(x) gets close to L as x gets close to a"

$f(x) \rightarrow L$ as $x \rightarrow a$



Delta and Epsilon

But "small" is still English and not "Mathematical-ish".

Let's choose two values **to be smaller than**:

δ that $|x-a|$ must be smaller than

ε that $|f(x)-L|$ must be smaller than

*(Note: Those two greek letters, δ is "delta" and ε is "epsilon", are often used for this, leading to the phrase "**delta-epsilon**")*

And we have:

$$\boxed{\text{"}|f(x)-L| < \varepsilon \text{ when } |x-a| < \delta\text{"}}$$

That actually says it! So if you understand that you understand limits ...

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... but to be **absolutely precise** we need to add these conditions:

1)	2)	3)
it is true for any $\varepsilon > 0$	δ exists, and is >0	x **not equal to** a means $\mathbf{0<\|x-a\|}$

And this is what we get:

> "for any $\varepsilon > 0$, there is a $\delta > 0$ so that $|f(x)-L| < \varepsilon$ when $0 < |x-a| < \delta$"

That is the formal definition. It actually looks pretty scary, doesn't it!

But in essence it still says something simple: when ***x gets close to a*** then ***f(x) gets close to L***.