

Limit and Continuity

Limit of a Function- Definition

A function is said to have a limit l as $x \rightarrow a$ written as $\lim_{x \rightarrow a} f(x) = l$ if $\epsilon > 0$,

however small \exists a +ve Real no. δ s.t-

$$|f(x) - l| < \epsilon \quad \forall \quad 0 < |x - a| < \delta$$

$$-\delta < x - a < \delta$$

$$a - \delta < x < a + \delta$$

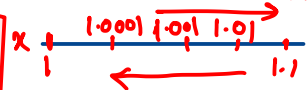
$$f(x) = \frac{x^2 - 1}{x - 1} \quad x \neq 1$$



| | | | | |
|--------|-----|------|-------|--------|
| x | .9 | .99 | .999 | .9999 |
| $f(x)$ | 1.9 | 1.99 | 1.999 | 1.9999 |



| | | | | |
|--------|-----|------|-------|--------|
| x | 1.1 | 1.01 | 1.001 | 1.0001 |
| $f(x)$ | 2.1 | 2.01 | 2.001 | 2.0001 |



$$\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1} = 2.$$

Left hand limit:- $\lim_{x \rightarrow a^-} f(x) = l.$

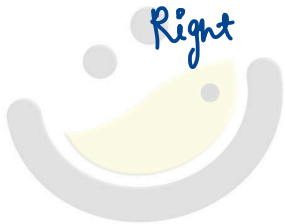
when $|f(x) - l| < \epsilon \forall$

$$a - \delta < x < a$$

Right hand limit:- $\lim_{x \rightarrow a^+} f(x) = l.$

when $|f(x) - l| < \epsilon \forall$

$$a < x < a + \delta$$



OMG! MATHS }
The poetry of logical ideas.