

Formal Limit Definitions

General Form of Definitions:

Given any _____ *(what is the challenge on f)* _____, there is a corresponding _____ *(what is the requirement on x)* _____, such that if x is _____ *(where it meets that requirement)* _____ then f(x) _____ *(beats the challenge)* _____.

Limit Definitions

$\lim f(x) =$

L

∞

$-\infty$

0 < |x - a| < δ

a < x < a + δ

a - δ < x < a

x > N, N > 0

x < N, N < 0

x → a

x → a⁺

x → a⁻

x → ∞

x → -∞

|f(x) - L| < ε

f(x) > M, M > 0

f(x) < M, M < 0

Example: $\lim_{x \rightarrow a^-} f(x) = L$

means that for every $\epsilon > 0$ there must be a corresponding δ such that if $a - \delta < x < a$ then $|f(x) - L| < \epsilon$.