Limits

Limits are a fundamental concept in calculus that deal with the idea of how close a function gets to a specific output value as its input value approaches another specific value. In simpler terms, it tells you what a function "wants to become" as its input gets infinitely closer (but never quite equal) to a certain point.

Notation:

Limits are written using the following notation:

$$lim_(x- > a)f(x) = L$$

This reads as "the limit of f(x) as x approaches a equals L”

Why Limits are Important:

Limits are crucial in calculus because they form the foundation for understanding:

- **Continuity:** A function is continuous at a point if its limit at that point exists and equals the function's value at that point.
- **Derivatives:** Derivatives, which measure the rate of change of a function, are defined using limits.
- **Integrals:** Integrals, which calculate the area under a function's curve, are also defined using limits.

The very important result we use for the derivation of function is: f'(a) of a given function f at a number a can be thought of as,

$$f'(a) = lim(x \to a)f(x) - f(a)/x - a$$