**MIT 18.01 Single Variable Calculus, Fall 2007**

This paper is not written by Massachusetts Institute of Technology (as they couldn’t write such sh🌼t). This is simply a short summary of lectures made by me for me.

**Lecture 2. What Is a Limit?**

(In previous paper I’ve already touched limits (but I shouldn’t)

Today we’ll take it in more detail.

There are 2 types of limits we implement:

(they’re all about the same, but with different details)

1. “Easy” limit.

It is the way our value x *tends* be x0`

*lim = f(x0)*

*x → x0*

Easy limit is easy (bruh). We can take value extremely close to x0.

1. Derivative limit.

Simply the same thing but with derivative

*lim = f(x0 +* Δx*) - f(x0) /* Δx

*x → x0*

Done with nerd boring stuff. Now let’s move on to… boring nerd stuff

(joke)

Limit types:

1. **Right-hand Limit**

It’s when our x → x0, but it’s x > x0

*lim =*

*x → x0+*

1. **Left-hand Limit**

It’s when our x → x0, but it’s x < x0

*lim =*

*x → x0-*

**Continuity**

Special way to describe our function as continuous or discontinuous.

Continuous: function is continuous when L and R limits exist and they are equal

Discontinuous

1. Jump discontinuity:

Our L and R limits exist, but they are not equal (see scans for more info)

1. Removable discontinuity:

L and R are equal, but they both don’t exist

1. Infinite discontinuity:

L or R or both limits are *inf* but defined

1. Strange behavior:

Strange functions with no L and R limits

**One more thing before I go…**

**Theorem:**

If function f is differentiable (it has derivative at point X0)

f is continuous function.