Lecture 3

Tuesday 4^{th} November, 2014

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1 Limits & Continuity

1.1 Continuity

If $x \to a$ then $f(x) \to L$, we say that L is the limit of $f(x)$ at $x = a$.

$\lim_{x \to a} f(x) = L$

We say that $f(x)$ is continuous at $x = a$, iff

$\lim_{x \to a} f(x) = L = f(a)$

1.2 Continuity

If $x \to a^+$ then $f(x) \to L_2$, and if $x \to a^-$ then $f(x) \to L_1$.
We say that $\exists \lim_{x \to a} f(x)$ iff $L_1 = L_2$

1.3 Cauchy's Definition

Let $f(x)$ be defined on an open interval about a, except possibly at a itself.
A number L is called the limit of $f(x)$ at a if

$$\forall \epsilon > 0 \exists \delta > 0 : 0 < |x - a| < \delta \Rightarrow |f(x) - L| < \epsilon \tag{1}$$