Error

If x is the exact value and $\hat{x}$ is know approximation, therefore

$\Delta(\hat{x}) := |x - \hat{x}|$

$\delta(\hat{x}) := \frac{\Delta(\hat{x})}{|\hat{x}|}$

$x = \hat{x} + \Delta$

$\hat{x} - \Delta \leq x \leq \hat{x} + \Delta$

So $\delta(\hat{x})$ is named *relational error* and $\Delta(\hat{x})$ is called *absolute error*.

Functions (mapping)

$f : \forall x \in X : y \in Y y = f(x)$

or

$f(x) := \{y \in Y | \exists x \ (x \in X \wedge y = f(x))\}$

or

$f : X \to Y$

Mapping

- Subjective $x \to y \mid f(x) = y$
- Injective $\forall x_1 x_2 \in X \mid f(x_1) = f(x_2) => x1 = x2$
- Bijective: injective and subjective

Sequences

A function $f : \natural \to X$ whose domain of definitions is the set of natural numbers is called a sequence

The terms of sequence is $f(n)$

$x_n = f(n)$

$\{x_n\} \equiv \{x_1, x_2, \ldots, x_n\}$

Limit

A number A belongs to the set of real numbers is called **the limit of numerical sequence** if for every neighbourhood of A there exists such index N depending on neighbourhood of A, so $x_n \in V(A),\ n > N$.

$lim_{n\to\infty} x_n = A := \forall V(A) \exists N \in \natural \vdots \forall n > N (n \in V(a))$

$lim_{n\to\infty} x_n := \forall \varepsilon > 0 \ \exists \ N \in \ \natural \vdots \forall n > N \ \ |x_n - A| < \varepsilon$

Properites

- If $\exists A \ \wedge \ \exists N \vdots \ x_n = A \forall n > N$, then $\{x_n\}$ is ultimately constant
- Any neighborhood of the limit of a sequence contains all but a finite number of terms of the sequence
- A convergent sequence cannot have two different limits.
- A convergent sequence is bounded.

$\{x_n\}$ and $\{y_n\}$ - numerical sequences. Then there is some product, quotient and sum. $\{x_n + y_n\},\ \{x_n \cdot y_n\},\ \{\frac{x_n}{y_n}\}$

Convergent

If $lim_{n\to\infty} = A$ and $x_n \to A$ as $n \to \infty$, then $\{x_n\}$ converges to A (tends to A)

If a sequence does not have a limit, it is called divergent.