Infinitos

teorema 1

$$\left.\begin{array}{l} u \to \infty, v \to \infty, \ldots, z \to \infty \\ [u] > [v] > \ldots > [z] \end{array}\right\} \Rightarrow u+v+\ldots+z \sim u$$

teorema 2

$$\left.\begin{array}{l} u \to \infty, v \to \infty \\ [u] \sim [v] \end{array}\right\} \Rightarrow [u-v] < [u] , [u-v] < [v]$$

Infinitésimos .

teorema 1

$$\left.\begin{array}{l} u \to 0, v \to 0, \ldots, z \to 0 \\ [u] > [v] > \ldots > [z] \end{array}\right\} \Rightarrow u+v+\ldots+z \sim z$$

teorema 2

$$\left.\begin{array}{l} u \to 0, v \to 0 \\ [u] \sim [v] \end{array}\right\} \Rightarrow [u-v] > [u] , [u-v] > [v]$$

Comparación de infinitos

$$\lim_{\substack{x \to a \neq 0 \\ \to 0 \\ \to \infty}} \frac{u}{v} = \begin{cases} \text{no } \exists , & \text{no son comparables} \\ 0 , [u] < [v] \\ \infty , [u] > [v] \\ a \neq 0, \ a \neq 1, & [u]=[v] \\ 1 , & [u] \sim [v] \end{cases}$$

Comparación de infinitésimos

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Escala de infinitos

$$z \to +\infty, \ a > 1, \ b > 1, \ \alpha > 0, \ \beta > 0, \ \gamma > 0, \ \lambda > 0$$

$$\left[\left(\log_b z^{\alpha}\right)^{\beta}\right] < \left[z^{\alpha}\right] < \left[a^{\gamma z}\right] < \left[z^{\lambda z}\right]$$

$$:\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!\longrightarrow 0^{+}$$

$$+\infty \longleftarrow\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!-\!\!:$$

Equivalentes

$a_n x^n + a_{n-1} x^{n-1} + \ldots + a_0 \sim a_n x^n$, $x \to \infty$

$a_n x^n + a_{n-1} x^{n-1} + \ldots + a_h x^h \sim a_h x^h$, $x \to 0$

$\lim_{u \to 0} (1+u)^{\frac{1}{u}} = e$

$\lim_{u \to \infty} \left(1+\frac{1}{u}\right)^u = e$

$Lu \sim (u-1)$, $u \to 1$

$Lu - Lv \sim \frac{u-v}{v}$, $u \sim v$

$e^u - 1 \sim u$, $u \to 0$

$e^u - e^v \sim e^v (u-v)$, $(u-v) \to 0$

$n.e^x \sim (x+1).n$, $x \to 0$

$a^u - 1 \sim u.La$, $u \to 0$

$a^u - a^v \sim a^{\square}.La.(u-v)$, $u \sim v \sim \square$

$\lim_{x \to \infty} \left(\frac{a^{\frac{1}{x}} + b^{\frac{1}{x}} + \ldots + z^{\frac{1}{x}}}{n} \right)^x = \sqrt[n]{a.b\ldots z}$

$\sqrt[n]{u} - \sqrt[n]{v} \sim \frac{u-v}{n.\sqrt[n]{a^{n-1}}}$, $a \neq o$, $u \to a$, $v \to a$

(Si $u \to \infty$, $v \to \infty$, $u \sim v \sim \square$, entonces $\square$ va en lugar de a)

$(1+u)^{\lambda} - 1 \sim \lambda u$, $u \to 0$ (recordar que $\sqrt[n]{a} = a^{\frac{1}{n}}$)

$u^{\lambda} - 1 \sim \lambda(u-1)$, $u \to 1$

$u^m - u^n \sim (m-n).(u-1)$, $u \to 1$

$u^n - v^n \sim n(u-v)(v)^{n-1}$, $u \sim v$, u no tiende a 0, $n \in R$

$u^u - 1 \sim (u-1)$, $u \to 1$

$u^v \sim e^{v.(u-1)}$, $u \to 1$, $v \to \infty$

$a^u + b^u \sim a^u$, $u \to +\infty$, $a > b > 0$

$f(u)-f(v) \sim f'(\square).(u-v)$, $u \sim v \sim \square$

Trigonométricos

sen u $\sim$ u , $u \to o$

tg u $\sim$ u , $u \to 0$

$1-\cos u \sim \frac{u^2}{2}$, $u \to 0$

$1-\cos u^n \sim \frac{u^{2n}}{2}$, $u \to 0$

$1-\cos^n u \sim n.(1-\cos u).1^{n-1} \sim n.\frac{u^2}{2}$, $u \to 0$

$\frac{1}{1+\cos u} \sim \frac{-2}{(u-\pi)^2}$, $u \to \pi$

Artg u $\sim$ u , $u \to 0$

Si: $u \sim v \sim \square$

sen u - sen v $\sim \cos\square.(u-v)$

cos u - cos v $\sim -\text{sen}\square.(u-v)$

tg u - tg v $\sim \sec^2\square.(u-v)$

Hiperbólicos

sh u $\sim$ u , $u \to 0$

th u $\sim$ u , $u \to 0$