Limites essentielles à connaître

On considère $\alpha > 0$ et $a > 1$.

$$\lim_{x\to 0}\frac{\sin x}{x} = 1 \qquad \lim_{x\to 0}\frac{1-\cos x}{x^2} = \frac{1}{2} \qquad \lim_{x\to 0}\frac{\tan x}{x} = 1 \qquad \lim_{x\to 0}\frac{\arcsin x}{x} = 1$$

$$\lim_{x\to +\infty}\frac{\ln x}{x} = 0 \qquad \lim_{x\to +\infty}\frac{\ln x}{x^\alpha} = 0 \qquad \lim_{x\to 0^+} x\ln x = 0 \qquad \lim_{x\to 0^+} x^\alpha \ln x = 0$$

$$\lim_{x\to +\infty}\frac{e^x}{x} = +\infty \qquad \lim_{x\to +\infty}\frac{e^x}{x^\alpha} = +\infty \qquad \lim_{x\to +\infty} x\, e^{-x} = 0 \qquad \lim_{x\to +\infty} x^\alpha e^{-x} = 0$$

$$\lim_{x\to 0}\frac{e^x - 1}{x} = 1 \qquad \lim_{x\to 0}\frac{a^x - 1}{x} = \ln a \qquad \lim_{x\to 0}\frac{\ln(1+x)}{x} = 1 \qquad \lim_{x\to +\infty}\frac{x^\alpha}{a^x} = 0$$

$$\lim_{x\to +\infty}\left(1+\frac{1}{x}\right)^x = e \qquad \lim_{x\to 0}\frac{(1+x)^\alpha - 1}{x} = \alpha \qquad \lim_{x\to 0}\frac{\arctan x}{x} = 1$$

Equivalents classiques

$$\sin x \underset{0}{\sim} x \qquad \tan x \underset{0}{\sim} x \qquad 1-\cos x \underset{0}{\sim} \frac{x^2}{2} \qquad \cot x \underset{0}{\sim} \frac{1}{x}$$

$$e^x - 1 \underset{0}{\sim} x \qquad \ln(1+x) \underset{0}{\sim} x \qquad \frac{1}{1+x} - 1 \underset{0}{\sim} -x \qquad \frac{1}{1-x} - 1 \underset{0}{\sim} x$$

$$(1+x)^p - 1 \underset{0}{\sim} p\,x \quad \text{avec } p \in \mathbb{R}^*$$

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