FORMULARIO

Limiti notevoli

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

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

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

4) $\lim_{x \to 0} \frac{\ln(1+x)}{x} = 1$

5) $\lim_{x \to 0} \frac{\ln(1+\alpha x)}{x} = \alpha$

6) $\lim_{x \to +\infty} \frac{a^x}{x^{\beta}} = +\infty, a > 1$

7) $\lim_{x \to +\infty} \frac{\ln^{\alpha} x}{x^{\beta}} = 0$

8) $\lim_{x \to 0^+} x^{\beta} \cdot \ln^{\alpha} x = 0; \ (\forall \alpha \in \Re, \forall \beta > 0)$

9) $\lim_{x \to 0} \frac{a^x - 1}{x} = \ln a = \frac{1}{\log_a e}$

10) $\lim_{x \to 0} \frac{e^x - 1}{x} = 1$

11) $\lim_{x \to 0} \frac{\log_a(1+x)}{x} = \log_a e = \frac{1}{\ln a}; \ a \in \Re^+ - \{1\}$

12) $\lim_{x \to 0} \frac{(1+x)^{\alpha} - 1}{x} = \alpha; \alpha \in \Re$

13) $\lim_{x \to 0} \frac{\sin x}{x} = 1$

14) $\lim_{x \to 0} \frac{\sin(ax)}{ax} = 1 \ (a \neq 0)$

15) $\lim_{x \to 0} \frac{\tan x}{x} = 1$

16) $\lim_{x \to 0} \frac{1-\cos x}{x^2} = \frac{1}{2}$

17) $\lim_{x \to 0} \frac{\arctan x}{x} = 1$

18) $\lim_{x \to 0} \frac{\arcsin x}{x} = 1$

19) $\lim_{x \to 0} \frac{\sinh x}{x} = 1$

20) $\lim_{x \to 0} \frac{\cosh x - 1}{x} = \frac{1}{2}$

Formule simboliche non indeterminate

$\frac{k}{0} = \infty \ldots\ldots\ldots\ldots\ldots k \neq 0$

$\infty \cdot k = \infty \ldots\ldots\ldots\ldots k \neq 0$

$k \cdot (-\infty) = -\infty \ldots\ldots\ldots k > 0$

$k \cdot (-\infty) = +\infty \ldots\ldots\ldots k < 0$

$(+\infty) \cdot (-\infty) = (-\infty) \cdot (+\infty) = -\infty$

$k^{-\infty} = 0 \ldots\ldots\ldots\ldots\ldots k > 1$

$k^{-\infty} = +\infty \ldots\ldots\ldots 0 < k < 1$

$(+\infty)^{-\infty} = 0$

$\frac{k}{\infty} = 0 \ldots\ldots\ldots\ldots\ldots k \neq \infty$

$\infty + k = \infty$

$k \cdot (+\infty) = +\infty \ldots\ldots k > 0$

$k \cdot (+\infty) = -\infty \ldots\ldots k < 0$

$(+\infty) \cdot (+\infty) = (-\infty) \cdot (-\infty) = +\infty$

$k^{+\infty} = +\infty \ldots\ldots\ldots\ldots k > 1$

$k^{+\infty} = 0 \ldots\ldots\ldots 0 < k < 1$

$(+\infty)^{+\infty} = +\infty$

Limiti notevoli e limiti generalizzati

Limite notevole	Formula generalizzata	Limiti di Funzioni elementari
$\lim_{x \to 0} \frac{\sin x}{x} = 1$	$\lim_{f(x) \to 0} \frac{\sin f(x)}{f(x)} = 1$	$\lim_{x \to +\infty} x^a = +\infty \ldots\ldots\ldots\ldots a > 0$
$\lim_{x \to 0} \frac{1-\cos x}{x^2} = \frac{1}{2}$	$\lim_{f(x) \to 0} \frac{1-\cos f(x)}{f^2(x)} = \frac{1}{2}$	$\lim_{x \to \pm\infty} \frac{1}{x^a} = 0 \ldots\ldots\ldots\ldots a > 0$
$\lim_{x \to 0} \frac{\log(1+x)}{x} = 1$	$\lim_{f(x) \to 0} \frac{\log[1+f(x)]}{f(x)} = 1$	$\lim_{x \to 0} \frac{1}{x^a} = \infty \ldots\ldots\ldots\ldots a > 0$
$\lim_{x \to 0} \frac{e^x - 1}{x} = 1$	$\lim_{f(x) \to 0} \frac{e^{f(x)} - 1}{f(x)} = 1$	$\lim_{x \to +\infty} a^x = +\infty \ldots\ldots\ldots\ldots a > 1$
$\lim_{x \to \infty} \left(1+\frac{1}{x}\right)^x = e$	$\lim_{f(x) \to \infty} \left(1+\frac{1}{f(x)}\right)^{f(x)} = e$	$\lim_{x \to +\infty} a^x = 0 \ldots\ldots\ldots\ldots 0 < a < 1$
$\lim_{x \to 0} (1+x)^{\frac{1}{x}} = e$	$\lim_{f(x) \to 0} [1+f(x)]^{\frac{1}{f(x)}} = e$	$\lim_{x \to -\infty} a^x = 0 \ldots\ldots\ldots\ldots a > 1$
$\lim_{x \to 0} \sin x = 0$		$\lim_{x \to -\infty} a^x = +\infty \ldots\ldots\ldots\ldots 0 < a < 1$
$\lim_{x \to 0} \cos x = 1$		$\lim_{x \to +\infty} \log_a x = +\infty \ldots\ldots\ldots\ldots a > 1$
		$\lim_{x \to +\infty} \log_a x = -\infty \ldots\ldots\ldots\ldots 0 < a < 1$
		$\lim_{x \to 0^+} \log_a x = -\infty \ldots\ldots\ldots\ldots a > 1$
		$\lim_{x \to 0^+} \log_a x = +\infty \ldots\ldots\ldots\ldots 0 < a < 1$
		$\lim_{x \to +\infty} \sqrt[n]{x} = +\infty$