ZOOLOGIA DELLE DERIVATE

a cura di Padovan Claudio (v. 1.01)

DERIVATE DI FUNZIONI ELEMENTARI

$\boldsymbol{f(x)}$	$\boldsymbol{f'(x)}$
c	0
x	1
x^n	nx^{n-1}
$\sqrt{x}$	$\frac{1}{2\sqrt{x}}$
$\frac{1}{\sqrt{x}}$	$-\frac{1}{2\sqrt{x^3}}$
$\sqrt[n]{x}$	$\frac{1}{n\sqrt[n]{x^{n-1}}}$
e^x	e^x
e^{-x}	$-e^{-x}$
$a^x (a > 0, a \neq 1)$	$a^x \ln a$
$a^{-x} (a > 0, a \neq 1)$	$-a^{-x} \ln a$
x^x	$x^x (\ln x + 1)$
$x^{\ln x}$	$e^{\ln^2 x} \cdot \frac{2}{x} \ln x$
$\ln x \ (x > 0)$	$\frac{1}{x}$
$\ln\lvert x\rvert$	$\frac{1}{x}$
$\log_a x \ (x > 0)$	$\frac{1}{x \ln a}$
$\log_a\lvert x\rvert$	$\frac{1}{x \ln a}$
$\sin x$	$\cos x$
$\cos x$	$-\sin x$

$\tan x$	$\frac{1}{\cos^2 x} = 1 + \tan^2 x = \sec^2 x$
$\cot x$	$-\frac{1}{\sin^2 x} = -[1 + \cot^2 x] = -\csc^2 x$
$\arcsin x$	$\frac{1}{\sqrt{1 - x^2}}$
$\arccos x$	$-\frac{1}{\sqrt{1 - x^2}}$
$\arctan x$	$\frac{1}{1 + x^2}$
$\mathrm{arccot}\, x$	$-\frac{1}{1 + x^2}$
$\sec x$	$\tan x \cdot \sec x$
$\csc x$	$-\cot \mathrm{x} \cdot \csc x$

DERIVATE DI FUNZIONI COMPOSTE

$y = f(x) \pm g(x)$	$y' = f'(x) \pm g'(x)$
$y = k \cdot f(x)$	$y' = k \cdot f'(x)$
$y = f(x) \cdot g(x)$	$y' = f'(x) \cdot g(x) + f(x) \cdot g'(x)$
$y = \sqrt{f(x)}$	$y' = \frac{f'(x)}{2\sqrt{f(x)}}$
$y = \frac{1}{f(x)}$	$y' = -\frac{f'(x)}{f^2(x)}$
$y = \frac{f(x)}{g(x)}$	$y' = \frac{f'(x) \cdot g(x) - f(x) \cdot g'(x)}{g^2(x)}$
$y = g[f(x)]$	$y' = g'[f(x)] \cdot f'(x)$
$y = e^{f(x)}$	$y' = e^{f(x)} \cdot f'(x)$
$y = a^{f(x)}$	$y' = a^{f(x)} \cdot f'(x) \cdot \ln a$
$y = [f(x)]^n, n \in \mathbb{R}$	$y' = n[f(x)]^{n-1} \cdot f'(x)$
$y = [f(x)]^{g(x)}$	$y' = [f(x)]^{g(x)} \cdot \left\{ g'(x) \cdot \ln f(x) + \frac{f'(x)}{f(x)} g(x) \right\}$

$y = \ln f(x)$	$y' = \frac{f'(x)}{f(x)}$
$y = \log_a f(x)$	$y' = \frac{f'(x)}{f(x)} \cdot \log_a e$
$y = \log_x \varphi(x) \ \ (\varphi(x) > 0, x > 0, x \neq 1)$	$y' = \left(\frac{\varphi'(x)}{\varphi(x)} - \frac{1}{x}\log_x \varphi(x)\right) \cdot \frac{1}{\ln x}$
$y = \sin f(x)$	$y' = f'(x) \cdot \cos f(x)$
$y = \cos f(x)$	$y' = -f'(x) \cdot \sin f(x)$
$y = \tan f(x)$	$y' = \frac{f'(x)}{\cos^2 f(x)} = f'(x) \cdot [1 + \tan^2 f(x)]$
$y = \cot f(x)$	$y' = -\frac{f'(x)}{\sin^2 f(x)}$
$\mathrm{y} = \arcsin f(x)$	$y' = \frac{f'(x)}{\sqrt{1 - f^2(x)}}$
$y = \arccos f(x)$	$y' = -\frac{f'(x)}{\sqrt{1 - f^2(x)}}$
$y = \arctan f(x)$	$y' = \frac{f'(x)}{1 + f^2(x)}$
$y = \operatorname{arccot} f(x)$	$y' = -\frac{f'(x)}{1 + f^2(x)}$
$y = \sin^{\mathrm{m}} f(x)\,, m = cost$	$y' = m \cdot f'(x) \sin^{\mathrm{m}-1} f(x) \cdot \cos f(x)$
$y = \cos^{\mathrm{m}} f(x), m = cost$	$y' = -m \cdot f'(x) \cos^{\mathrm{m}-1} f(x) \cdot \sin f(x)$
$y = \tan^{\mathrm{m}} f(x), m = cost$	$y' = \frac{-m \cdot f'(x) \tan^{\mathrm{m}-1} f(x)}{\cos^2 f(x)}$
$y = \sin[f(x)]^m\,, m = cost$	$y' = m[f(x)]^{m-1} f'(x) \cdot \cos[f(x)]^m$
$y = \cos[f(x)]^{\mathrm{m}}, m = cost$	$y' = -m[f(x)]^{m-1} f'(x) \cdot \sin[f(x)]^m$
$y = \tan[f(x)]^{\mathrm{m}}, m = cost$	$y' = \frac{m[f(x)]^{m-1} f'(x)}{\cos^2[f(x)]^m}$
$y = \sin^{\mathrm{m}}[f(x)]^n\,, m, n = cost$	$y' = m \cdot n \cdot [f(x)]^{n-1} f'(x) \sin^{\mathrm{m}-1}[f(x)]^n \cdot \cos[f(x)]^n$
$y = \cos^{\mathrm{m}}[f(x)]^n, m, n = cost$	$y' = -m \cdot n \cdot [f(x)]^{n-1} f'(x) \cos^{\mathrm{m}-1}[f(x)]^n \cdot \sin[f(x)]^n$
$y = \tan^{\mathrm{m}}[f(x)]^n, m, n = cost$	$y' = \frac{m \cdot n \cdot [f(x)]^{n-1} f'(x) \tan^{\mathrm{m}-1}[f(x)]^n}{\cos^2[f(x)]^n}$