Derivate Fondamentali

Funzione

$y = f(x)$ — $y' = f'(x)$

Funzione costante

$y = k$ — $y = 0$

Funzione esponenziale

$y = a^x$ — $y' = a^x \ln a$

$y = e^x$ — $y' = e^x$

Funzione potenza

$y = x^n,\ n \in \mathbb{R}$ — $y' = n x^{n-1}$

$y = x$ — $y' = 1$

$y = \frac{1}{x}$ — $y' = -\frac{1}{x^2}$

$y = \sqrt{x}$ — $y' = \frac{1}{2\sqrt{x}}$

$y = \sqrt[n]{x}$ — $y' = \frac{1}{n\sqrt[n]{x^{n-1}}}$

Funzione goniometriche

$y = \operatorname{sen} x$ — $y' = \cos x$

$y = \cos x$ — $y' = -\operatorname{sen} x$

$y = \operatorname{tg} x$ — $y' = \frac{1}{\cos^2 x} = 1 + \operatorname{tg}^2 x$

$y = \operatorname{ctg} x$ — $y' = -\frac{1}{\operatorname{sen}^2 x} = -(1 + \operatorname{ctg}^2 x)$

Funzioni goniometriche inverse

$y = \operatorname{arc\,sen} x$ — $y' = \frac{1}{\sqrt{1-x^2}}$

$y = \operatorname{arc\,cos} x$ — $y' = -\frac{1}{\sqrt{1-x^2}}$

$y = \operatorname{arc\,tan} x$ — $y' = \frac{1}{1+x^2}$

$y = \operatorname{arc\,cotan} x$ — $y' = -\frac{1}{1+x^2}$

Regole di derivazione

derivata di una costante per una funzione: $D[k \cdot f(x)] = k \cdot f'(x)$

derivata di una somma di funzioni: $D[f(x) + g(x) + h(x)] = f'(x) + g'(x) + h'(x)$

derivata di un prodotto: $D[f(x) \cdot g(x)] = f'(x) \cdot g(x) + f(x) \cdot g'(x)$

derivata di un quoziente: $D\left[\frac{f(x)}{g(x)}\right] = \frac{f'(x) \cdot g(x) - f(x) \cdot g'(x)}{[g(x)]^2}$ con $g(x) \neq 0$

derivata del reciproco di una funzione $= -\frac{f'(x)}{[f(x)]^2}$ con $f(x) \neq 0$

derivata di una funzione composta (funz. di funz.) $= D[f(g(x))] = f'[g(x)] \cdot g'(x)$

in particolare:

$y = \ln|x|$ — $y' = \frac{1}{x}$

$y = \ln|f(x)|$ — $y' = \frac{f'(x)}{f(x)}$

$y = |f(x)|$ — $y' = \frac{|f(x)|}{f(x)} \cdot f'(x)$

$y = a^{f(x)}$ — $y' = a^{f(x)} \cdot \ln a \cdot f'(x)$

$y = e^{f(x)}$ — $y' = e^{f(x)} \cdot f'(x)$

$y = [f(x)]^n$ — $y' = n \cdot [f(x)]^{n-1} \cdot f'(x)$

derivata di una funzione composta esponenziale: $D[f(x)]^{g(x)} = [f(x)]^{g(x)} \cdot \left[g'(x) \cdot \ln f(x) + \frac{g(x) \cdot f'(x)}{f(x)}\right]$

derivata di una funzione inversa: $D[f^{-1}(y)] = \left[\frac{1}{f'(x)}\right]$ con $x = f^{-1}$

Integrali fondamentali

Integrali notevoli

$$\int f'(x)\,dx = f(x)+c$$

$$\int a\,dx = ax+c$$

$$\int x^n\,dx = \frac{x^{n+1}}{n+1}+c$$

$$\int \frac{1}{x}\,dx = \ln|x|+c$$

$$\int \text{sen}(x)\,dx = -\cos(x)+c$$

$$\int \cos(x)\,dx = \text{sen}(x)+c$$

$$\int \text{arccos}(x)\,dx = x\,\text{arccos}\,x-\sqrt{1-x^2}+c$$

$$\int \text{arcsen}(x)\,dx = x\,\text{arcsen}\,x+\sqrt{1-x^2}+c$$

$$\int \frac{1}{\cos^2(x)}\,dx = \tan(x)+c$$

$$\int \frac{1}{\text{sen}^2(x)}\,dx = -\cot(x)+c$$

$$\int e^x\,dx = e^x+c$$

$$\int a^x\,dx = \frac{a^x}{\ln(a)}+c$$

$$\int \text{senh}(x)\,dx = \cosh(x)+c$$

$$\int \cosh(x)\,dx = \text{senh}(x)+c$$

$$\int \frac{1}{1+x^2}\,dx = \text{arctan}(x)+c$$

$$\int \frac{1}{\sqrt{1-x^2}}\,dx = \text{arcsen}(x)+c$$

$$\int \frac{-1}{\sqrt{1-x^2}}\,dx = \text{arccos}(x)+c$$

$$\int \tan x\,dx = -\ln|\cos x|+c$$

$$\int \text{cotan}\,x\,dx = \ln|\text{sen}\,x|+c$$

$$\int \text{arccotan}\,x\,dx = x\,\text{arccotan}+\frac{1}{2}\ln|1+x^2|+c$$

$$\int x\,dx = \frac{x^2}{2}+c$$

Integrali notevoli in forma generale

$$\int f'(g(x))\cdot g'(x)\,dx = f(g(x))+c$$

$$\int [f(x)]^n f'(x)\,dx = \frac{[f(x)]^{n+1}}{n+1}+c \qquad n\neq 1$$

$$\int \frac{f'(x)}{f(x)}\,dx = \ln|f(x)|+c$$

$$\int \text{sen}(f(x))\cdot f'(x)\,dx = -\cos f(x)+c$$

$$\int \cos(f(x))\cdot f'(x)\,dx = \text{sen}(f(x))+c$$

$$\int \frac{1}{\cos^2(x)f(x)}\cdot f'(x)\,dx = \tan(f(x))+c$$

$$\int \frac{1}{\text{sen}^2(x)f(x)}\cdot f'(x)\,dx = -\cot(f(x))+c$$

$$\int e^{f(x)}\cdot f'(x)\,dx = e^{f(x)}+c$$

$$\int a^{f(x)}\cdot f'(x)\,dx = \frac{a^{f(x)}}{\ln(a)}+c$$

$$\int \text{senh}(f(x))\cdot f'(x)\,dx = \cosh(f(x))+c$$

$$\int \cosh(f(x))\cdot f'(x)\,dx = \text{senh}(f(x))+c$$

$$\int \frac{1}{1+[f(x)]^2}\cdot f'(x)\,dx = \text{arctan}(f(x))+c$$

$$\int \frac{1}{\sqrt{1-[f(x)]^2}}\cdot f'(x)\,dx = \text{arcsen}(f(x))+c$$

$$\int \frac{-1}{\sqrt{1-[f(x)]^2}}\cdot f'(x)\,dx = \text{arccos}(f(x))+c$$