Derivacije

Osnovna pravila deriviranja:

- derivacija konstante: $\boxed{c' = 0}$
- derivacija umnoška konstante i funkcije: $\boxed{(c \cdot f)' = c \cdot f'}$
- derivacija zbroja i razlike: $\boxed{(f \pm g)' = f' \pm g'}$
- derivacija umnoška: $\boxed{(f \cdot g)' = f' \cdot g + f \cdot g'}$ $\boxed{(f \cdot g \cdot h)' = f'gh + fg'h + fgh'}$
- derivacija kvocjenta: $\boxed{\left(\frac{f}{g}\right)' = \frac{f' \cdot g - f \cdot g'}{g^2}}$

Derivacije elemetarnih funkcija:

$x' = 1$	$(x^n)' = n \cdot x^{n-1}$
$\left(\frac{1}{x}\right)' = -\frac{1}{x^2}$	$\left(\frac{1}{x^n}\right)' = -\frac{n}{x^{n+1}}$
$\left(\sqrt{x}\right)' = \frac{1}{2\sqrt{x}}$	$\left(\sqrt[n]{x}\right)' = \frac{1}{n \cdot \sqrt[n]{x^{n-1}}}$
$(e^x)' = e^x$	$(a^x)' = a^x \cdot \ln a$
$(\ln x)' = \frac{1}{x}$	$(\log_a x)' = \frac{1}{x \cdot \ln a}$
$(\sin x)' = \cos x$	$(\cos x)' = -\sin x$
$(\operatorname{tg} x)' = \frac{1}{\cos^2 x}$	$(\operatorname{cg} x)' = \frac{1}{\sin^2 x}$
$(\sin^{-1} x)' = \frac{1}{\sqrt{1-x^2}}$	$(\cos^{-1} x)' = -\frac{1}{\sqrt{1-x^2}}$
$(\operatorname{tg}^{-1} x)' = \frac{1}{1+x^2}$	$(\operatorname{ctg}^{-1} x)' = -\frac{1}{1+x^2}$
$(\sinh x)' = \cosh x$	$(\cosh x)' = \sinh x$
$(\operatorname{tgh} x)' = \frac{1}{\cosh^2 x}$	$(\operatorname{ctgh} x)' = -\frac{1}{\sinh^2 x}$
$(\sinh^{-1} x)' = \frac{1}{\sqrt{1+x^2}}$	$(\operatorname{tgh}^{-1} x)' = \frac{1}{1-x^2}$
$(\cosh^{-1} x)' = \frac{1}{\sqrt{x^2-1}}$	$(\operatorname{ctgh}^{-1} x)' = -\frac{1}{x^2-1}$

v1.0 by tkr

Integrali

Opća pravila integriranja:

- ako je $\int f(x)\mathrm{d}x = F(x) + c$ tada je $F' = f$
- $\boxed{\int c \cdot f(x)\mathrm{d}x = c \cdot \int f(x)\mathrm{d}x}$
- $\boxed{\int \mathrm{d}x = x + c}$
- integral zbroja i razlike: $\boxed{\int [f(x) \pm g(x)]\mathrm{d}x = \int f(x)\mathrm{d}x \pm \int g(x)\mathrm{d}x}$
- pravilo supstitucije: ako je $x = \varphi(t)$, tada je: $\boxed{\int f(x)\mathrm{d}x = \int f[\varphi(t)] \cdot \varphi'(t)\mathrm{d}t}$
- parcijalna integracija: $\boxed{\int (f \cdot g') = f \cdot g - \int (f' \cdot g)}$

Tablica osnovnih integrala (kod svakog integrala s desne strane jednakosti treba dodati konstantu c)

$\int x^n \mathrm{d}x$	$=$	$\frac{x^{n+1}}{n+1}$ $(n \neq 1)$	$\int \frac{\mathrm{d}x}{x}$	$=$	$\ln \lvert x \rvert$
$\int e^x \mathrm{d}x$	$=$	e^x	$\int a^x \mathrm{d}x$	$=$	$\frac{a^x}{\ln a}$
$\int \sin x \, \mathrm{d}x$	$=$	$-\cos x$	$\int \cos x \, \mathrm{d}x$	$=$	$\sin x$
$\int \operatorname{tg} x \, \mathrm{d}x$	$=$	$-\ln \lvert \cos x \rvert$	$\int \operatorname{ctg} x \, \mathrm{d}x$	$=$	$\ln \lvert \sin x \rvert$
$\int \frac{\mathrm{d}x}{\cos^2 x}$	$=$	$\operatorname{tg} x$	$\int \frac{\mathrm{d}x}{\sin^2 x}$	$=$	$-\operatorname{ctg} x$
$\int \sinh x \, \mathrm{d}x$	$=$	$\cosh x$	$\int \cosh x \, \mathrm{d}x$	$=$	$\sinh x$
$\int \operatorname{tgh} x \mathrm{d}x$	$=$	$\ln \lvert \cosh x \rvert$	$\int \operatorname{ctgh} x \mathrm{d}x$	$=$	$\ln \lvert \sinh x \rvert$
$\int \frac{\mathrm{d}x}{\cosh^2 x}$	$=$	$\operatorname{tgh} x$	$\int \frac{\mathrm{d}x}{\sinh^2 x}$	$=$	$-\operatorname{ctgh} x$
$\int \frac{\mathrm{d}x}{a^2 + x^2}$	$=$	$\frac{1}{a} \cdot \operatorname{tg}^{-1} \frac{x}{a}$	$\int \frac{\mathrm{d}x}{\sqrt{a^2 - x^2}}$	$=$	$\sin^{-1} \frac{x}{a}$
$\int \frac{\mathrm{d}x}{a^2 - x^2}$	$=$	$\frac{1}{a} \cdot \operatorname{tgh}^{-1} \frac{x}{a}$	$\int \frac{\mathrm{d}x}{\sqrt{a^2 + x^2}}$	$=$	$\sinh^{-1} \frac{x}{a}$
$\int \frac{\mathrm{d}x}{x^2 - a^2}$	$=$	$-\frac{1}{a} \cdot \operatorname{ctgh}^{-1} \frac{x}{a}$	$\int \frac{\mathrm{d}x}{\sqrt{x^2 - a^2}}$	$=$	$\cosh^{-1} \frac{x}{a}$

Određeni integral:

- ako je $F' = f$ onda: $\boxed{\int_a^b f(x)\mathrm{d}x = F(b) - F(a)}$