Diferenciální počet

$(\text{konst.})' = 0$	$(\sin x)' = \cos x$	$(\arcsin x)' = \frac{1}{\sqrt{1-x^2}}$
$(x^\alpha)' = \alpha \cdot x^{\alpha-1}$	$(\cos x)' = -\sin x$	$(\arccos x)' = -\frac{1}{\sqrt{1-x^2}}$
$(\mathrm{a}^x)' = \mathrm{a}^x \cdot \ln \mathrm{a}$	$(\mathrm{tg}\, x)' = \frac{1}{\cos^2 x}$	$(\mathrm{arctg}\, x)' = \frac{1}{1+x^2}$
$(\log_\mathrm{a} x)' = \frac{1}{x \cdot \ln \mathrm{a}}$	$(\mathrm{cotg}\, x)' = -\frac{1}{\sin^2 x}$	$(\mathrm{arccotg}\, x)' = -\frac{1}{1+x^2}$
$(\mathrm{e}^x)' = \mathrm{e}^x$	$(x)' = 1$	$(\sqrt{x})' = \frac{1}{2 \cdot \sqrt{x}}$
$(\ln x)' = \frac{1}{x}$	$\left(\frac{1}{x}\right)' = -\frac{1}{x^2}$	$(\log x)' = \frac{1}{x \cdot \ln 10}$
$(u \pm v)' = u' \pm v'$	$(u \cdot v)' = u' \cdot v + u \cdot v'$	$\left(\frac{u}{v}\right)' = \frac{u' \cdot v - u \cdot v'}{v^2}$
$[f(g(x))]' = f'(g(x)) \cdot g'(x)$	$f(x)^{g(x)} = \mathrm{e}^{g(x) \cdot \ln f(x)}$	$(k \cdot f(x))' = k \cdot f'(x)$

Integrální počet

$\int x^\alpha \,\mathrm{d}x = \frac{x^{\alpha+1}}{\alpha+1} + C, \alpha \neq -1$	$\int \frac{1}{x} \,\mathrm{d}x = \ln\lvert x\rvert + C$	$\int \mathrm{a}^x \,\mathrm{d}x = \frac{\mathrm{a}^x}{\ln \mathrm{a}} + C$
$\int \mathrm{e}^x \,\mathrm{d}x = \mathrm{e}^x + C$	$\int \sin x \,\mathrm{d}x = -\cos x + C$	$\int \cos x \,\mathrm{d}x = \sin x + C$
$\int \frac{\mathrm{d}x}{\cos^2 x} = \mathrm{tg}\, x + C$	$\int \frac{\mathrm{d}x}{\sin^2 x} = -\mathrm{cotg}\, x + C$	$\int \frac{\mathrm{d}x}{\sqrt{1-x^2}} = \arcsin x + C$
$\int \frac{\mathrm{d}x}{1+x^2} = \mathrm{arctg}\, x + C$	$\int 0 \,\mathrm{d}x = C$	$\int \mathrm{d}x = x + C$

$\int k \cdot f(x) \,\mathrm{d}x = k \cdot \int f(x) \,\mathrm{d}x$ $\qquad$ $\int (f(x) \pm g(x)) \,\mathrm{d}x = \int f(x) \,\mathrm{d}x \pm \int g(x) \,\mathrm{d}x$

$\int u' \cdot v = u \cdot v - \int u \cdot v'$ $\qquad$ $\int_a^b u' \cdot v = [u \cdot v]_a^b - \int_a^b u \cdot v'$

$$\int f(g(x)) \cdot g'(x) \,\mathrm{d}x = \left| \begin{matrix} g(x) = t \\ g'(x)\,\mathrm{d}x = \mathrm{d}t \end{matrix} \right| = \int f(t) \,\mathrm{d}t = \cdots = F(t) = F(g(x)) + C$$

$\int f(ax+b) \,\mathrm{d}x = \frac{1}{a} F(ax+b) + C$ (pro $F'(x) = f(x)$) $\qquad$ $\int \frac{g'(x)}{g(x)} \mathrm{d}x = \ln\lvert g(x)\rvert + C$

$$\int_a^b f(g(x)) \cdot g'(x) \,\mathrm{d}x = \left| \begin{matrix} g(x) = t & a \to g(a) \\ g'(x)\mathrm{d}x = \mathrm{d}t & b \to g(b) \end{matrix} \right| = \int_{g(a)}^{g(b)} f(t) \,\mathrm{d}t = [F(t)]_{g(a)}^{g(b)} = F(g(b)) - F(g(a))$$

Použití určitého integrálu

$$P = \int_a^b f(x)\,\mathrm{d}x \ [f(x) \geq 0 \text{ na } \langle a,b\rangle] \quad P = \int_a^b (f(x) - g(x))\,\mathrm{d}x \ [f(x) \geq g(x) \text{ na } \langle a,b\rangle]$$

$$V = \pi \cdot \int_a^b f^2(x)\,\mathrm{d}x \quad l = \int_a^b \sqrt{1 + (f'(x))^2}\,\mathrm{d}x \quad S = 2\pi \cdot \int_a^b f(x) \cdot \sqrt{1 + (f'(x))^2}\,\mathrm{d}x$$

Funkce gama a beta

$$\Gamma(x) = \int_0^\infty t^{x-1} \cdot \mathrm{e}^{-t}\,\mathrm{d}t, \quad \Gamma(x+1) = x \cdot \Gamma(x), \quad \Gamma(n+1) = n!, \quad \Gamma(\tfrac{1}{2}) = \sqrt{\pi},$$

$$\mathrm{B}\,(x,y) = \int_0^1 t^{x-1} \cdot (1-t)^{y-1}\,\mathrm{d}t, \quad \mathrm{B}\,(x,y) = \mathrm{B}\,(y,x), \quad \mathrm{B}\,(x,y) = \frac{\Gamma(x) \cdot \Gamma(y)}{\Gamma(x+y)}.$$

Goniometrické funkce

$$\sin\,(x \pm 2k\pi) = \sin x, \ \cos\,(x \pm 2k\pi) = \cos x, \ \mathrm{tg}\,(x \pm k\pi) = \mathrm{tg}\,x, \ \mathrm{cotg}\,(x \pm k\pi) = \mathrm{cotg}\,x,$$

$$\sin\,(-x) = -\sin x, \quad \cos\,(-x) = \cos x, \quad \mathrm{tg}\,(-x) = -\mathrm{tg}\,x, \quad \mathrm{cotg}\,(-x) = -\mathrm{cotg}\,x,$$

$$\mathrm{tg}\,x = \frac{\sin x}{\cos x}, \quad \mathrm{cotg}\,x = \frac{\cos x}{\sin x}, \quad \mathrm{tg}\,x \cdot \mathrm{cotg}\,x = 1, \quad \sin^2 x + \cos^2 x = 1.$$

x	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π
$\sin x$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\cos x$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1
$\mathrm{tg}\,x$	$*$	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	$*$	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0
$\mathrm{cotg}\,x$	0	$-\frac{\sqrt{3}}{3}$	-1	$-\sqrt{3}$	$*$	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	$-\frac{\sqrt{3}}{3}$	-1	$-\sqrt{3}$	$*$

$$\sin\,(\alpha \pm \beta) = \sin\alpha \cdot \cos\beta \pm \cos\alpha \cdot \sin\beta, \qquad \cos\,(\alpha \pm \beta) = \cos\alpha \cdot \cos\beta \mp \sin\alpha \cdot \sin\beta,$$

$$\mathrm{tg}\,(\alpha \pm \beta) = \frac{\mathrm{tg}\,\alpha \pm \mathrm{tg}\,\beta}{1 \mp \mathrm{tg}\,\alpha \cdot \mathrm{tg}\,\beta}, \qquad \mathrm{cotg}\,(\alpha \pm \beta) = \frac{\mathrm{cotg}\,\alpha \cdot \mathrm{cotg}\,\beta \mp 1}{\mathrm{cotg}\,\beta \pm \mathrm{cotg}\,\alpha},$$

$$\sin 2\alpha = 2 \cdot \sin\alpha \cdot \cos\alpha, \quad \cos 2\alpha = \cos^2\alpha - \sin^2\alpha, \quad \mathrm{tg}\,2\alpha = \frac{2 \cdot \mathrm{tg}\,\alpha}{1 - \mathrm{tg}^2\alpha},$$

$$\mathrm{cotg}\,2\alpha = \frac{\mathrm{cotg}^2\alpha - 1}{2 \cdot \mathrm{cotg}\,\alpha}, \quad \sin^2\alpha = \frac{1 - \cos 2\alpha}{2}, \quad \cos^2\alpha = \frac{1 + \cos 2\alpha}{2}.$$

Vydala ČZU