Diferenciální počet

$(\text{konst.})' = 0$ $\quad (\sin x)' = \cos x$ $\quad (\arcsin x)' = \dfrac{1}{\sqrt{1-x^2}}$

$(x^\alpha)' = \alpha \cdot x^{\alpha-1}$ $\quad (\cos x)' = -\sin x$ $\quad (\arccos x)' = -\dfrac{1}{\sqrt{1-x^2}}$

$(\mathrm{a}^x)' = \mathrm{a}^x \cdot \ln \mathrm{a}$ $\quad (\mathrm{tg}\, x)' = \dfrac{1}{\cos^2 x}$ $\quad (\mathrm{arctg}\, x)' = \dfrac{1}{1+x^2}$

$(\log_\mathrm{a} x)' = \dfrac{1}{x \cdot \ln \mathrm{a}}$ $\quad (\mathrm{cotg}\, x)' = -\dfrac{1}{\sin^2 x}$ $\quad (\mathrm{arccotg}\, x)' = -\dfrac{1}{1+x^2}$

$(\mathrm{e}^x)' = \mathrm{e}^x$ $\quad (x)' = 1$ $\quad (\sqrt{x})' = \dfrac{1}{2 \cdot \sqrt{x}}$

$(\ln x)' = \dfrac{1}{x}$ $\quad \left(\dfrac{1}{x}\right)' = -\dfrac{1}{x^2}$ $\quad (\log x)' = \dfrac{1}{x \cdot \ln 10}$

$(u \pm v)' = u' \pm v'$ $\quad (u \cdot v)' = u' \cdot v + u \cdot v'$ $\quad \left(\dfrac{u}{v}\right)' = \dfrac{u' \cdot v - u \cdot v'}{v^2}$

$$(f(g(x)))' = f'(g(x)) \cdot g'(x) \qquad \left(f(x)^{g(x)}\right)' = f(x)^{g(x)} \cdot (g(x) \ln f(x))'$$

Integrální počet

$\displaystyle\int x^\alpha \,\mathrm{d}x = \frac{x^{\alpha+1}}{\alpha+1} + C, \alpha \neq -1$ $\quad \displaystyle\int \frac{1}{x} \,\mathrm{d}x = \ln|x| + C$ $\quad \displaystyle\int \mathrm{a}^x \,\mathrm{d}x = \frac{\mathrm{a}^x}{\ln \mathrm{a}} + C$

$\displaystyle\int \mathrm{e}^x \,\mathrm{d}x = \mathrm{e}^x + C$ $\quad \displaystyle\int \sin x \,\mathrm{d}x = -\cos x + C$ $\quad \displaystyle\int \cos x \,\mathrm{d}x = \sin x + C$

$\displaystyle\int \frac{\mathrm{d}x}{\cos^2 x} = \mathrm{tg}\, x + C$ $\quad \displaystyle\int \frac{\mathrm{d}x}{\sin^2 x} = -\mathrm{cotg}\, x + C$ $\quad \displaystyle\int \frac{\mathrm{d}x}{\sqrt{1-x^2}} = \arcsin x + C$

$\displaystyle\int \frac{\mathrm{d}x}{1+x^2} = \mathrm{arctg}\, x + C$ $\quad \displaystyle\int 0 \,\mathrm{d}x = C$ $\quad \displaystyle\int \mathrm{d}x = x + C$

Použití určitého integrálu

$P = \int_a^b (f(x) - g(x))\,\mathrm{d}x \quad P = \iint_D \mathrm{d}x\,\mathrm{d}y \quad V = \pi \int_a^b f^2(x)\,\mathrm{d}x \quad V = \iiint_D \mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z$

$l = \int_a^b \sqrt{1 + (f'(x))^2}\,\mathrm{d}x \quad S = 2\pi \int_a^b f(x)\sqrt{1 + (f'(x))^2}\,\mathrm{d}x \quad m = \iiint_D \varrho(x,y,z)\,\mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z$

$x_T = \frac{1}{m} \iiint_D x\varrho(x,y,z)\,\mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z \quad y_T = \frac{1}{m} \iiint_D y\varrho(x,y,z)\,\mathrm{d}x\,\mathrm{d}y\,\mathrm{d}z \quad z_T$ - analogicky

Transformace souřadnic

polární: $x = r\cos t,\ y = r \sin t,\ r \in \langle 0, \infty),\ t \in \langle 0, 2\pi),\ |J(r,t)| = r$

válcové: $x = r\cos t,\ y = r\sin t,\ z = z,\ r \in \langle 0,\infty),\ t \in \langle 0, 2\pi),\ |J(r,t,z)| = r$

sférické: $x = r\cos t \sin u,\ y = r \sin t \sin u,\ z = r\cos u,\ r \in \langle 0, \infty),\ t \in \langle 0, 2\pi),\ u \in \langle 0, \pi)$
$|J(r,t,u)| = r^2 \sin u$

Funkce gama a beta

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

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

Laplaceova transformace

$\mathscr{L}\{f(t)\} = L(p) = \int_0^\infty f(t) \cdot \mathrm{e}^{-pt}\,\mathrm{d}t, \quad \mathscr{L}\{f(at)\} = \frac{1}{a} \cdot L(\frac{p}{a}), \quad \mathscr{L}\{f(t)\cdot \mathrm{e}^{at}\} = L(p-a),$

$\mathscr{L}\{f(t-b)\} = L(p) \cdot \mathrm{e}^{-pb}, \quad \mathscr{L}\{t \cdot f(t)\} = -L'(p), \quad \mathscr{L}\{f'(t)\} = p \cdot L(p) - f(0+),$

$\mathscr{L}\{f^{(n)}(t)\} = p^n \cdot L(p) - p^{n-1} \cdot f(0+) - p^{n-2} \cdot f'(0+) - \cdots - p \cdot f^{(n-2)}(0+) - f^{(n-1)}(0+).$

$f(t)$	$\delta(t)$	1	t	t^n	$t^n\mathrm{e}^{at}$	e^{at}	$\sin(at)$	$\cos(at)$
$L(p)$	1	$\frac{1}{p}$	$\frac{1}{p^2}$	$\frac{n!}{p^{n+1}}$	$\frac{n!}{(p-a)^{n+1}}$	$\frac{1}{p-a}$	$\frac{a}{p^2+a^2}$	$\frac{p}{p^2+a^2}$
$f(t)$	$t\sin(at)$	$t\cos(at)$	$\sin^2(at)$	$\cos^2(at)$	$\mathrm{e}^{at}\sin(bt)$	$\mathrm{e}^{at}\cos(bt)$	$\sinh(at)$	$\cosh(at)$
$L(p)$	$\frac{2ap}{(p^2+a^2)^2}$	$\frac{p^2-a^2}{(p^2+a^2)^2}$	$\frac{2a^2}{p(p^2+4a^2)}$	$\frac{p^2+2a^2}{p(p^2+4a^2)}$	$\frac{b}{(p-a)^2+b^2}$	$\frac{p-a}{(p-a)^2+b^2}$	$\frac{a}{p^2-a^2}$	$\frac{p}{p^2-a^2}$

Goniometrické funkce

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

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

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

x	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
$\sin x$	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
$\cos x$	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
$\mathrm{tg}\, x$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	–	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0
$\mathrm{cotg}\, x$	–	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	$-\frac{\sqrt{3}}{3}$	-1	$-\sqrt{3}$	–

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

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

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

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

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