

Kvadratická rovnice

$$ax^2 + bx + c = 0, \quad a \neq 0$$

$$x_{1,2} = \frac{-b \pm \sqrt{D}}{2a}, \quad \text{kde } D = b^2 - 4ac$$

Viètovy vzorce:

$$x^2 + px + q = 0 \quad \rightarrow \quad \begin{aligned} x_1 + x_2 &= -p \\ x_1 \cdot x_2 &= q \end{aligned}$$

Vzorce pro úpravy algebraických výrazů

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

$$(a \pm b)^3 = a^3 \pm 3a^2b + 3ab^2 \pm b^3$$

$$a^2 - b^2 = (a + b)(a - b)$$

$$a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$$

Goniometrické vzorce

$$\sin^2 x + \cos^2 x = 1$$

$$\sin 2x = 2 \sin x \cos x$$

$$\cos 2x = \cos^2 x - \sin^2 x$$

$$\sin^2 x = \frac{1 - \cos 2x}{2}$$

$$\cos^2 x = \frac{1 + \cos 2x}{2}$$

Vzorce pro exponenciální a logaritmické funkce

$$a^y = x \Leftrightarrow y = \log_a x$$

$$\log_a (x_1 \cdot x_2) = \log_a x_1 + \log_a x_2$$

$$a^{x_1} \cdot a^{x_2} = a^{x_1 + x_2}$$

$$\log_a \frac{x_1}{x_2} = \log_a x_1 - \log_a x_2$$

$$\frac{a^{x_1}}{a^{x_2}} = a^{x_1 - x_2}$$

$$\log_a x^k = k \cdot \log_a x$$

$$(a^{x_1})^{x_2} = a^{x_1 \cdot x_2}$$

$$\log_a x = \frac{\log_b x}{\log_b a}$$

$$a^x \cdot b^x = (a \cdot b)^x$$

$$\log_a x = -\log_{\frac{1}{a}} x$$

Vzorce pro derivování

$$[c \cdot f(x)]' = c \cdot f'(x)$$

$$[f(x) \pm g(x)]' = f'(x) \pm g'(x)$$

$$[f(x) \cdot g(x)]' = f'(x) \cdot g(x) + f(x) \cdot g'(x)$$

$$\left[\frac{f(x)}{g(x)} \right]' = \frac{f'(x) \cdot g(x) - f(x) \cdot g'(x)}{(g(x))^2}$$

$f(x)$	$f'(x)$
c	0
x^n	nx^{n-1}
e^x	e^x
a^x	$a^x \cdot \ln a$
$\ln x$	$\frac{1}{x}$
$\log_a x$	$\frac{1}{x \cdot \ln a}$
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\operatorname{tg} x$	$\frac{1}{\cos^2 x}$
$\operatorname{cotg} x$	$-\frac{1}{\sin^2 x}$
$\arcsin x$	$\frac{1}{\sqrt{1-x^2}}$
$\arccos x$	$-\frac{1}{\sqrt{1-x^2}}$
$\operatorname{arctg} x$	$\frac{1}{1+x^2}$
$\operatorname{arccotg} x$	$-\frac{1}{1+x^2}$

Vzorce pro integrování

$$\int f(x) \, dx = F(x) + c, \quad \text{kde } F'(x) = f(x)$$

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

$$\int [f(x) + g(x)] \, dx = \int f(x) \, dx + \int g(x) \, dx$$

$$\text{Per partes: } \int u \cdot v' \, dx = u \cdot v - \int u' \cdot v \, dx$$

$f(x)$	$F(x)$
0	c
x^n	$\frac{x^{n+1}}{n+1}$
e^x	e^x
a^x	$\frac{a^x}{\ln a}$
$\frac{1}{x}$	$\ln x $
$\sin x$	$-\cos x$
$\cos x$	$\sin x$
$\frac{1}{\cos^2 x}$	$\operatorname{tg} x$
$\frac{1}{\sin^2 x}$	$-\operatorname{cotg} x$
$\frac{1}{\sqrt{1-x^2}}$	$\arcsin x$
$\frac{1}{1+x^2}$	$\operatorname{arctg} x$

Odvozené vzorce:

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

$$\int f(ax+b) \, dx = \frac{1}{a} F(ax+b) + c$$

$$\int \frac{1}{x^2+a^2} \, dx = \frac{1}{a} \operatorname{arctg} \frac{x}{a} + c$$

$$\int \frac{1}{\sqrt{a^2-x^2}} \, dx = \arcsin \frac{x}{a} + c$$