BPM_MATE

Pravidla pro derivování:

$$\big(cf(x)\big)' = cf'(x),\ c \in \mathbb{R},$$

$$\big(f(x) + g(x)\big)' = f'(x) + g'(x),$$

$$\big(f(x) \cdot g(x)\big)' = f'(x)g(x) + f(x)g'(x),$$

je-li $g(x) \neq 0$, pak $\left(\dfrac{f(x)}{g(x)}\right)' = \dfrac{f'(x)g(x) - f(x)g'(x)}{g^2(x)}$,

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

Derivace elementárních funkcí:

$$c' = 0, \qquad (x^a)' = ax^{a-1},$$

$$(e^x)' = e^x, \qquad (\ln x)' = \frac{1}{x},$$

$$(\sin x)' = \cos x, \qquad (\cos x)' = -\sin x,$$

$$(\operatorname{tg} x)' = \frac{1}{\cos^2 x}, \qquad (\operatorname{cotg} x)' = -\frac{1}{\sin^2 x},$$

$$(\arcsin x)' = \frac{1}{\sqrt{1-x^2}}, \qquad (\arccos x)' = -\frac{1}{\sqrt{1-x^2}},$$

$$(\operatorname{arctg} x)' = \frac{1}{x^2+1}, \qquad (\operatorname{arccotg} x)' = -\frac{1}{x^2+1},$$

$$(a^x)' = a^x \cdot \ln a, \qquad \big(\log_a x\big)' = \frac{1}{x \ln a},$$

Součet prvních n členů geometrické posloupnosti ($q \neq 1$):

$$s_n = a_1 \frac{1-q^n}{1-q}$$

Pravidla pro integrování:

$$\int (f(x) + g(x))\, \mathrm{d}x = \int f(x)\, \mathrm{d}x + \int g(x)\, \mathrm{d}x,$$

$$\int \alpha f(x)\, \mathrm{d}x = \alpha \int f(x) \mathrm{d}x,$$

$$\int u(x)v'(x)\, \mathrm{d}x = u(x)v(x) - \int u'(x)v(x)\, \mathrm{d}x,$$

$$\int f(x)\, \mathrm{d}x = F(x) + c \Longrightarrow \int f(ax+b)\, \mathrm{d}x = \tfrac{1}{a}F(ax+b) + c.$$

Vzorečky pro integrování elementárních funkcí:

$$\int 1\, \mathrm{d}x = x + c,$$

$$\int x^n\, \mathrm{d}x = \tfrac{x^{n+1}}{n+1} + c, \quad n \neq -1,$$

$$\int \tfrac{1}{x}\, \mathrm{d}x = \ln|x| + c,$$

$$\int \mathrm{e}^x\, \mathrm{d}x = \mathrm{e}^x + c,$$

$$\int a^x\, \mathrm{d}x = \tfrac{a^x}{\ln a} + c, \quad a > 0,\ a \neq 1,$$

$$\int \sin x\, \mathrm{d}x = -\cos x + c,$$

$$\int \cos x\, \mathrm{d}x = \sin x + c,$$

$$\int \tfrac{1}{x^2+1}\, \mathrm{d}x = \operatorname{arctg} x + c,$$

$$\int \tfrac{1}{(x-x_0)^2+a^2}\, \mathrm{d}x = \tfrac{1}{a}\operatorname{arctg}\left(\tfrac{x-x_0}{a}\right) + c,$$

$$\int \tfrac{1}{\sqrt{a^2-x^2}}\, \mathrm{d}x = \arcsin \tfrac{x}{a} + c,$$

$$\int \tfrac{1}{\sqrt{x^2+a}}\, \mathrm{d}x = \ln|x + \sqrt{x^2+a}| + c,$$

$$\int \tfrac{1}{\cos^2 x}\, \mathrm{d}x = \operatorname{tg} x + c,$$

$$\int \tfrac{1}{\sin^2 x}\, \mathrm{d}x = -\operatorname{cotg} x + c,$$

$$\int \tfrac{f'(x)}{f(x)}\, \mathrm{d}x = \ln|f(x)| + c.$$

Součet nekonečné geometrické řady ($|q| < 1$):

$$s = \frac{a_1}{1-q}$$