Neurčité integrály vo výpočtovom systéme MathCAD

Označenie v MathCAD:	tan(x)	cot(x)	atan(x)	asin(x)	csc(x)	exp(x)
Tradičné označenie:	tg x	cotg x	arctg x	arcsin x	cosec x = $\frac{1}{\sin(x)}$	e^x

Priklad 1: Vypočítajte substitučnou metódou

$$\int x^2 \sin\left(5x^3\right) dx \to \frac{-1}{15}\cdot\cos\left(5\cdot x^3\right) \qquad \int e^{5x} dx \to \frac{1}{5}\cdot\exp(5\cdot x) \qquad \int \frac{3^x}{\sqrt{1-9^x}} dx = \frac{\operatorname{asin}\left(3^x\right)}{\ln(3)}$$

$$\int \frac{1}{(2x+3)^4} dx \to \frac{-1}{6\cdot(2\cdot x+3)^3} \qquad \int \sqrt[8]{2x+7}\, dx \to \frac{4}{9}\cdot(2\cdot x+7)^{\frac{9}{8}} \qquad \int \frac{x^5}{\sqrt[3]{10-x^6}} dx \to \frac{-1}{4}\cdot\left(10-x^6\right)^{\frac{2}{3}}$$

$$\int \frac{x^2}{1+x^6} dx \to \frac{1}{3}\cdot\operatorname{atan}\left(x^3\right) \qquad \int \frac{\ln(x)^4}{x} dx \to \frac{1}{5}\cdot\ln(x)^5 \qquad \int e^x \cot\left(e^x\right) dx \to \frac{-1}{2}\cdot\ln\left(1+\cot(\exp(x))^2\right)$$

$$\int \frac{1}{\sin(x)} dx \to \ln(\csc(x)-\cot(x)) \qquad \int \frac{x^2}{\sin\left(x^3\right)} dx \to \frac{1}{3}\cdot\ln\left(\csc\left(x^3\right)-\cot\left(x^3\right)\right) \qquad \int \cot(2x+1)\, dx \to \frac{-1}{4}\cdot\ln\left(2+2\cdot\cot(2\cdot x+1)^2\right)$$

$$\int \frac{2x^2}{\cos\left(x^3-1\right)^2} dx \to \frac{2}{3\cdot\cos\left(x^3-1\right)}\cdot\sin\left(x^3-1\right) \qquad \int \frac{\ln(\operatorname{atan}(x))}{\left(1+x^2\right)\operatorname{atan}(x)} dx \to \frac{1}{2}\cdot\ln(\operatorname{atan}(x))^2$$

$$\int x\cdot\tan\left(1-x^2\right) dx \to \frac{-1}{4}\cdot\ln\left(1+\tan\left(-1+x^2\right)^2\right)$$

$$\int \frac{e^{\frac{1}{x}}}{x^2} dx \to -\exp\left(\frac{1}{x}\right) \qquad \int x\cdot\ln\left(3+x^2\right) dx \to \frac{1}{2}\cdot\left(3+x^2\right)\cdot\ln\left(3+x^2\right)-\frac{3}{2}-\frac{1}{2}\cdot x^2 \qquad \int \cos(x)\cdot\sin(x)\, dx \to \frac{-1}{2}\cdot\cos(x)^2$$

$$\int \frac{\tan(x)}{\cos(x)^2} dx \to \frac{1}{2\cdot\cos(x)^2} \qquad \int \frac{\sin(x)}{\sqrt{\cos(x)^5}} dx \to \frac{2}{3}\cdot\frac{\cos(x)}{\left(\cos(x)^5\right)^{\frac{1}{2}}} \qquad \int \frac{\cos(x)}{25+\sin(x)^2} dx \to \frac{1}{5}\cdot\operatorname{atan}\left(\frac{1}{5}\cdot\sin(x)\right)$$

Priklad 2: Vypočítajte metódou per partes (+substit)

$$\int \ln(x)\,dx \to x\cdot\ln(x) - x \qquad \int \operatorname{atan}(x)\,dx \to x\cdot\operatorname{atan}(x) - \frac{1}{2}\cdot\ln\left(1 + x^2\right) \qquad \int x\cdot\ln(x)\,dx \to \frac{1}{2}\cdot x^2\cdot\ln(x) - \frac{1}{4}\cdot x^2$$

$$\int x\cdot\operatorname{atan}(x)\,dx \to \frac{1}{2}\cdot x^2\cdot\operatorname{atan}(x) - \frac{1}{2}\cdot x + \frac{1}{2}\cdot\operatorname{atan}(x) \qquad \int \operatorname{atan}\left(\sqrt{x}\right)dx \to x\cdot\operatorname{atan}\left(x^{\frac{1}{2}}\right) - x^{\frac{1}{2}} + \operatorname{atan}\left(x^{\frac{1}{2}}\right)$$

$$\int x\cdot\ln(x)^2\,dx \to \frac{1}{2}\cdot x^2\cdot\ln(x)^2 - \frac{1}{2}\cdot x^2\cdot\ln(x) + \frac{1}{4}\cdot x^2$$

$$\int e^{\sqrt{x}}\,dx \to 2\cdot\exp\left(x^{\frac{1}{2}}\right)\cdot x^{\frac{1}{2}} - 2\cdot\exp\left(x^{\frac{1}{2}}\right) \qquad \int \cos(\ln(x))\,dx \to \frac{1}{2}\cdot x\cdot(\sin(\ln(x)) + \cos(\ln(x))) \qquad \int \frac{\ln(\ln(x))}{x}\,dx \to \ln(\ln(x))\cdot\ln(x) - \ln(x)$$

$$\int e^x\cdot\cos(2x)\,dx \to \frac{1}{5}\cdot\exp(x)\cdot\cos(2\cdot x) + \frac{2}{5}\cdot\exp(x)\cdot\sin(2\cdot x) \qquad \int \sin(x)\cos(3x)\,dx \to \frac{-1}{8}\cdot\cos(4\cdot x) + \frac{1}{4}\cdot\cos(2\cdot x)$$

$$\int \operatorname{acos}(x)\,dx \to x\cdot\operatorname{acos}(x) - \left(1 - x^2\right)^{\frac{1}{2}}$$

Priklad 3: Vypočítajte rozkladom na parciálne zlomky

$$\int \frac{1}{3x^2 - 11x + 6}\,dx \to \frac{-1}{7}\cdot\ln(3\cdot x - 2) + \frac{1}{7}\cdot\ln(x - 3) \qquad \int \frac{1}{(x-1)x^2}\,dx \to \ln(x-1) + \frac{1}{x} - \ln(x)$$

$$\int \frac{3x^2 + 30x - 120}{(x-2)\cdot(x+2)\cdot(x-5)}\,dx \to 4\cdot\ln(x-2) - 6\cdot\ln(x+2) + 5\cdot\ln(x-5)$$

$$\int \frac{x^2 - 2x + 3}{(x+2)\left(x^2 - 6x + 10\right)}\,dx \to \frac{11}{26}\cdot\ln(x+2) + \frac{15}{52}\cdot\ln\left(x^2 - 6\cdot x + 10\right) + \frac{29}{26}\cdot\operatorname{atan}(x-3)$$

$$\int \frac{3x-4}{(x-2)\cdot(x-1)^3}\,dx \to 2\cdot\ln(x-2) - \frac{1}{2\cdot(x-1)^2} + \frac{2}{x-1} - 2\cdot\ln(x-1) \qquad \int \frac{1}{2(x+4)\left(x - \frac{3}{2}\right)}\,dx \to \frac{-1}{11}\cdot\ln(x+4) + \frac{1}{11}\cdot\ln(2\cdot x - 3)$$

$$\int \frac{9x^4 + 3x^3 - 23x^2 + x}{9(x-1)\cdot\left(x - \frac{1}{3}\right)\cdot\left(x + \frac{2}{3}\right)}\,dx \to x + \frac{1}{2}\cdot x^2 - \ln(x-1) + \frac{1}{3}\cdot\ln(3\cdot x - 1) - \frac{2}{3}\cdot\ln(3\cdot x + 2)$$

$$\int \frac{5x^3 - 15x^2 + 15x - 3}{(x-1)\cdot(x-2)(x-5)}\,dx \to 5\cdot x + \frac{1}{2}\cdot\ln(x-1) - \frac{7}{3}\cdot\ln(x-2) + \frac{161}{6}\cdot\ln(x-5)$$

$$\int \frac{1}{x\cdot(x+1)\cdot(x+2)}\,dx \to \frac{1}{2}\cdot\ln(x) - \ln(x+1) + \frac{1}{2}\cdot\ln(x+2) \qquad \int \frac{x-1}{(x+1)(x+2)^2}\,dx \to -2\cdot\ln(x+1) - \frac{3}{x+2} + 2\cdot\ln(x+2)$$

Priklad 4: Vypočítajte

$$\int \sin(x)^2\,dx \to \frac{-1}{2}\cdot\cos(x)\cdot\sin(x) + \frac{1}{2}\cdot x \qquad \int \frac{x}{x+\sqrt{x}}\,dx \to x + \ln(x-1) - 2\cdot x^{\frac{1}{2}} + 2\cdot\operatorname{atanh}\left(x^{\frac{1}{2}}\right) \qquad \int \frac{1}{\sin(x)}\,dx \to \ln(\csc(x)-\cot(x))$$

$$\int \sin(x)\cos(x)^5\,dx \to \frac{-1}{6}\cdot\cos(x)^6 \qquad \int \cot(x)^2\,dx \to -\cot(x) + \frac{1}{2}\cdot\pi - \operatorname{acot}(\cot(x)) \qquad \int x^2\cos(x)\,dx \to x^2\cdot\sin(x) - 2\cdot\sin(x) + 2\cdot x\cdot\cos(x)$$

$$\int \ln\left(1+x^2\right)dx \to x\cdot\ln\left(1+x^2\right) - 2\cdot x + 2\cdot\operatorname{atan}(x) \qquad \int x\cdot e^{-x^2}\,dx \to \frac{-1}{2}\cdot\exp\left(-x^2\right) \qquad \int \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx \to 2\cdot\exp\left(x^{\frac{1}{2}}\right)$$

$$\int \frac{e^x}{e^{2x}+4}\,dx \to \frac{1}{2}\cdot\operatorname{atan}\left(\frac{1}{2}\cdot\exp(x)\right) \qquad \int \frac{1}{\cos(x)}\,dx \to \ln(\sec(x)+\tan(x)) \qquad \int \frac{1}{\sin(x)\cos(x)}\,dx \to \ln(\tan(x))$$

$$\int x^2\ln(x)\,dx \to \frac{1}{3}\cdot x^3\cdot\ln(x) - \frac{1}{9}\cdot x^3 \qquad \int x^2\operatorname{atan}(x)\,dx \to \frac{1}{3}\cdot x^3\cdot\operatorname{atan}(x) - \frac{1}{6}\cdot x^2 + \frac{1}{6}\cdot\ln\left(1+x^2\right) \qquad \int \frac{\ln(x)}{\sqrt{x}}\,dx \to 4\cdot x^{\frac{1}{2}}\cdot\ln\left(x^{\frac{1}{2}}\right) - 4\cdot x^{\frac{1}{2}}$$

$$\int \frac{\ln(x)^4}{x}\,dx \to \frac{1}{5}\cdot\ln(x)^5 \qquad \int e^{\cos(x)}\sin(x)\,dx \to -\exp(\cos(x)) \qquad \int \frac{\cos(\ln(x))}{x}\,dx \to \sin(\ln(x))$$