Derivace

Derivace a aritmetické operace

$(f+g)'(x) = f'(x) + g'(x)$

$(cf)'(x) = cf'(x)$

$(fg)'(x) = f'(x)g(x) + f(x)g'(x)$

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

Derivace elementárních funkcí

$(c)' = 0$

$(x^n)' = nx^{n-1}$

$(\mathrm{e}^x)' = \mathrm{e}^x$

$(a^x)' = a^x \ln a$

$(\ln x)' = \frac{1}{x}$

$(\log_a x)' = \frac{1}{x \ln a}$

$(\sin x)' = \cos x$

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

$(\operatorname{tg} x)' = \frac{1}{\cos^2 x}$

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

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

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

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

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

Integrál

Integrál a aritmetické operace

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

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

Integrály elementárních funkcí

$\int k\,\mathrm{d}x = kx + C$

$\int x^n\,\mathrm{d}x = \frac{x^{n+1}}{n+1} + C$

$\int \frac{1}{x}\,\mathrm{d}x = \ln|x| + C$

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

$\int a^x\,\mathrm{d}x = \frac{a^x}{\ln a} + C$

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

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

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

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

$\int \frac{1}{\sqrt{1-x^2}}\,\mathrm{d}x = \arcsin x + C$

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

Obsah plochy

$S = \int\limits_a^b f(x)\,\mathrm{d}x$

$S = \int\limits_\alpha^\beta \psi(t)\cdot\varphi'(t)\,\mathrm{d}t$

$S = \int\limits_\alpha^\beta \frac{1}{2}r^2(\varphi)\,\mathrm{d}\varphi$

Délka křivky

$l = \int\limits_a^b \sqrt{1+[f'(x)]^2}\,\mathrm{d}x$

$l = \int\limits_\alpha^\beta \sqrt{[\varphi'(t)]^2+[\psi'(t)]^2}\,\mathrm{d}t$

$l = \int\limits_\alpha^\beta \sqrt{[r(\varphi)]^2+[r'(\varphi)]^2}\,\mathrm{d}\varphi$

Objem rotačního tělesa

$V = \pi\int\limits_a^b f^2(x)\,\mathrm{d}x$

$V = \pi\int\limits_\alpha^\beta [\psi(t)]^2\cdot|\varphi'(t)|\ \mathrm{d}t$

$V = \pi\int\limits_\alpha^\beta r^2(\varphi)\sin^2\varphi\cdot|r'(\varphi)\cos\varphi - r(\varphi)\sin\varphi|\ \mathrm{d}\varphi$

Obsah pláště rotačního tělesa

$S = 2\pi\int\limits_a^b |f(x)|\sqrt{1+[f'(x)]^2}\,\mathrm{d}x$

$S = 2\pi\int\limits_\alpha^\beta |\psi(t)|\sqrt{[\varphi'(t)]^2+[\psi'(t)]^2}\,\mathrm{d}t$

$S = 2\pi\int\limits_\alpha^\beta |r(\varphi)\sin\varphi|\sqrt{[r(\varphi)]^2+[r'(\varphi)]^2}\,\mathrm{d}\varphi$