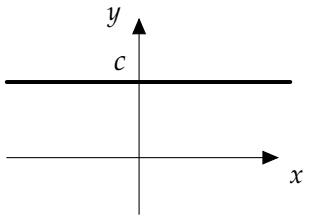
Funkce

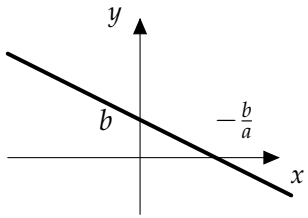
KMDG, FS, VŠB-TUO

Polynomy

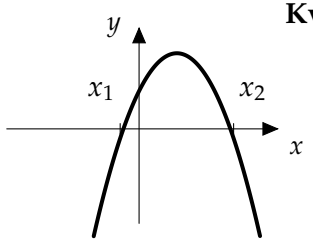
Konstantní funkce $y = c$



Lineární funkce $y = ax + b$



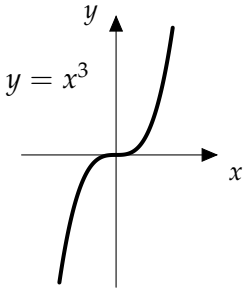
Kvadratická funkce $y = ax^2 + bx + c$

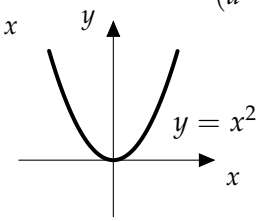


$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

vrchol paraboly $\left[-\frac{b}{2a}; c - \frac{b^2}{4a}\right]$

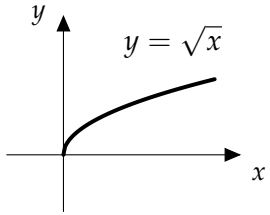
Mocninná funkce $x^n, \quad n \in \mathbb{N}$

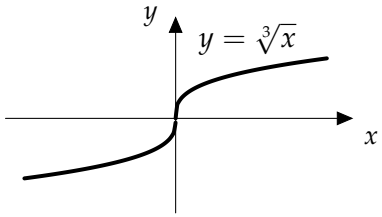




$$(a-b)(a+b) = a^2 - b^2$$
$$(a+b)(a^2 - ab + b^2) = a^3 + b^3$$
$$(a-b)(a^2 + ab + b^2) = a^3 - b^3$$
$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = a^2 - 2ab + b^2$$
$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$
$$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$

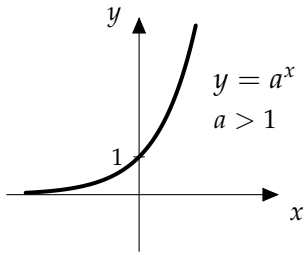
Funkce odmocnina

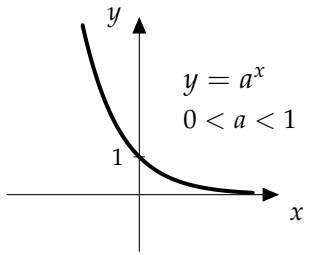




$$\sqrt[n]{a} = a^{\frac{1}{n}}$$
$$\sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{a\,b}$$
$$\left(\sqrt[n]{a}\right)^m = \sqrt[n]{a^m}$$
$$\sqrt[m]{\sqrt[n]{a}} = \sqrt[m\,n]{a}$$

Exponenciální funkce

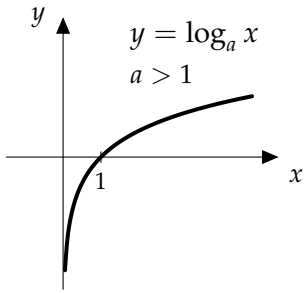


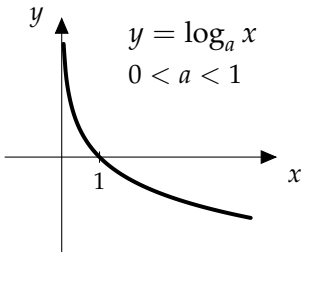


$$a^r \cdot a^s = a^{r+s}$$
$$\frac{a^r}{a^s} = a^{r-s}$$
$$(a^r)^s = a^{r \cdot s}$$
$$(a \cdot b)^r = a^r \cdot b^r$$

$y = \mathrm{e}^x$ přirozená exponenciální funkce, Eulerovo číslo $\mathrm{e} = 2.71828\ldots$

Logaritmická funkce

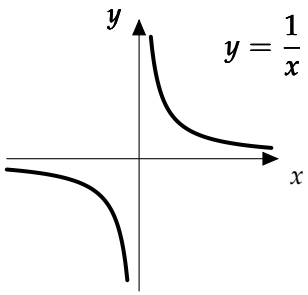




$$\log_a a^x = x$$
$$a^{\log_a x} = x$$
$$\log_a(rs) = \log_a r + \log_a s$$
$$\log_a\left(\frac{r}{s}\right) = \log_a r - \log_a s$$
$$\log_a r^n = n \log_a r$$
$$\log_a x = \frac{\log_b x}{\log_b a} \qquad \log_a x = \frac{\ln x}{\ln a}$$

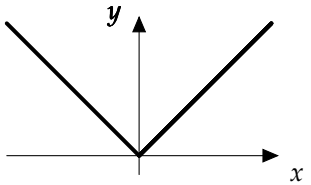
$y = \ln(x)$ přirozený logaritmus (základ je e)
$y = \log(x)$ dekadický logaritmus (základ je 10)

Lineární lomená funkce



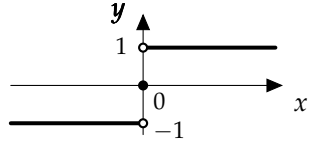
Absolutní hodnota

$$|x| = \begin{cases} -x & x < 0 \\ x & x \geq 0 \end{cases}$$



Funkce signum

$$\operatorname{sign} x = \begin{cases} -1 & x < 0 \\ 0 & x = 0 \\ 1 & x > 0 \end{cases}$$



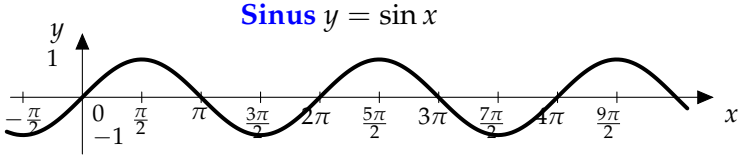
EVROPSKÁ UNIE
Evropské strukturální a investiční fondy
Operační program Výzkum, vývoj a vzdělávání
MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY

Funkce (goniometrické, cyklometrické, hyperbolické)

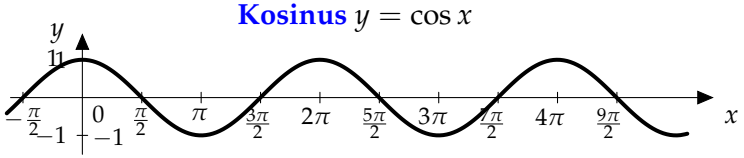
KMDG, FS, VŠB-TUO

Goniometrické funkce

Sinus $y = \sin x$

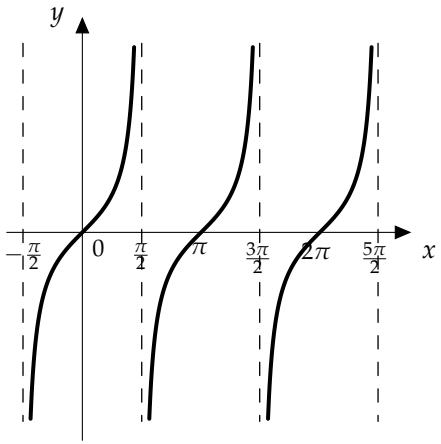


Kosinus $y = \cos x$

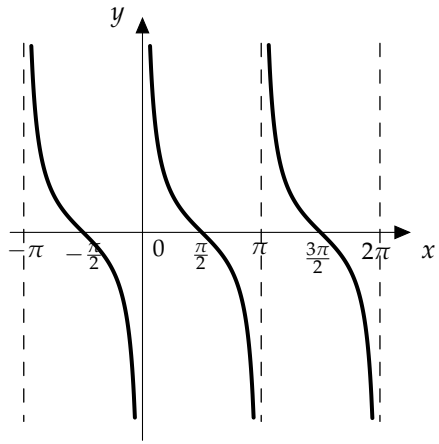


	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\sin x$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos x$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\tan x$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	$\times$
$\cot x$	$\times$	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0

Tangens $y = \tan x$



Kotangens $y = \cot x$



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

$$\tan x \cdot \cot x = 1$$

$$\tan x = \frac{\sin x}{\cos x} \qquad \cot x = \frac{\cos x}{\sin x}$$

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

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

$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$

$$\cot 2x = \frac{\cot^2 x - 1}{2 \cot x}$$

$$\sin(x + y) = \sin x \cos y + \cos x \sin y$$

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

$$\cos(x + y) = \cos x \cos y - \sin x \sin y$$

$$\cos(x - y) = \cos x \cos y + \sin x \sin y$$

$$\tan(x \pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y}$$

$$\cot(x \pm y) = \frac{\cot x \cot y \mp 1}{\cot y \pm \cot x}$$

$$\sin x + \sin y = 2 \sin \frac{x + y}{2} \cos \frac{x - y}{2}$$

$$\sin x - \sin y = 2 \cos \frac{x + y}{2} \sin \frac{x - y}{2}$$

$$\cos x + \cos y = 2 \cos \frac{x + y}{2} \cos \frac{x - y}{2}$$

$$\cos x - \cos y = -2 \sin \frac{x + y}{2} \sin \frac{x - y}{2}$$

$$\tan x \pm \tan y = \frac{\sin(x \pm y)}{\cos x \cos y}$$

$$\cot x \pm \cot y = \frac{\sin(y \pm x)}{\sin x \sin y}$$

$$\left|\sin \frac{x}{2}\right| = \sqrt{\frac{1 - \cos x}{2}}$$

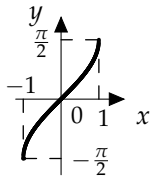
$$\left|\cos \frac{x}{2}\right| = \sqrt{\frac{1 + \cos x}{2}}$$

$$\left|\tan \frac{x}{2}\right| = \sqrt{\frac{1 - \cos x}{1 + \cos x}}$$

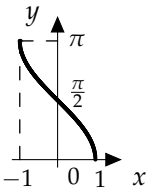
$$\left|\cot \frac{x}{2}\right| = \sqrt{\frac{1 + \cos x}{1 - \cos x}}$$

Cyklometrické funkce

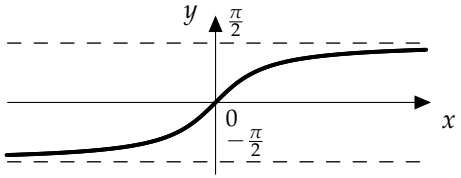
Arkussinus $y = \operatorname{acrsin} x$



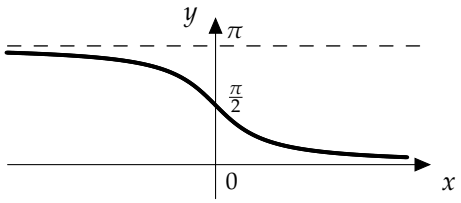
Arkuskosinus $y = \operatorname{acrcos} x$



Arkustangens $y = \operatorname{acrtan} x$



Arkuskotangens $y = \operatorname{acrcot} x$



$$\sin(\arcsin x) = x$$

$$\arcsin(\sin x) = x \quad \text{pro } x \in \left\langle -\tfrac{\pi}{2}, \tfrac{\pi}{2} \right\rangle$$

$$\cos(\arccos x) = x$$

$$\arccos(\cos x) = x \quad \text{pro } x \in \langle 0, \pi \rangle$$

$$\tan(\arctan x) = x$$

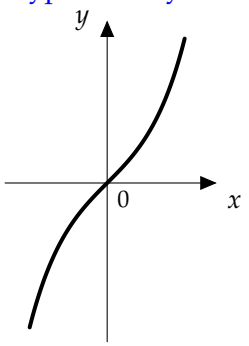
$$\arctan(\tan x) = x \quad \text{pro } x \in \left(-\tfrac{\pi}{2}, \tfrac{\pi}{2}\right)$$

$$\operatorname{cot}(\operatorname{arccot} x) = x$$

$$\operatorname{arccot}(\operatorname{cot} x) = x \quad \text{pro } x \in (0, \pi)$$

Hyperbolické funkce

Hyperbolický sinus $y = \sinh x = \frac{e^x - e^{-x}}{2}$



Hyperbolický kosinus $y = \cosh x = \frac{e^x + e^{-x}}{2}$