

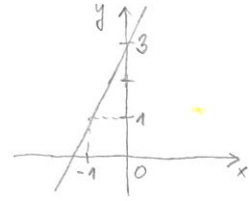
ELEMENTÁRNÍ FUNKCE

Lineární funkce $y = ax + b$

- $a, b \in \mathbb{R}$; $D(f) = \mathbb{R}$
- graf: přímka

pr: $y = 2x + 3$

x	0	-1
y	3	1

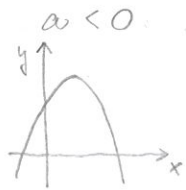
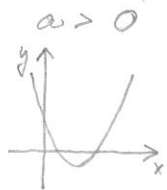
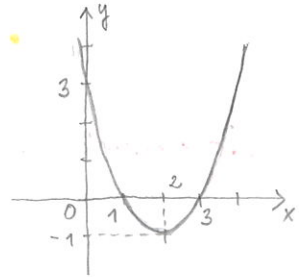


- $a = 0$: konstantní funkce $y = b$
- $b = 0$: přímá úměrnost $y = ax$

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

- $a, b, c \in \mathbb{R}$; $a \neq 0$; $D(f) = \mathbb{R}$
- graf: parabola

pr: $y = x^2 - 4x + 3$
 $y = (x-2)^2 - 1$
 $V[2, -1]$



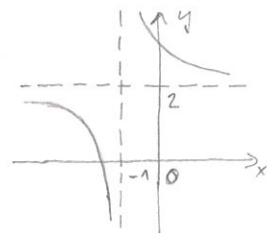
Lineární lomená funkce $y = \frac{ax+b}{cx+d}$

- $a, b, c, d \in \mathbb{R}$; $c \neq 0$; $ad - bc \neq 0$
- $D(f) = \mathbb{R} - \{-\frac{d}{c}\}$
- graf: rovnosá hyperbola

pr: $y = \frac{2x+3}{x+1}$, $D(f) = \mathbb{R} - \{-1\}$

$y = \frac{1}{x+1} + 2$

$S[-1, 2]$

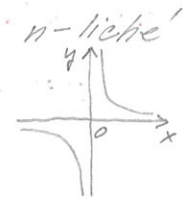
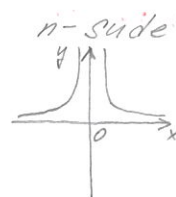
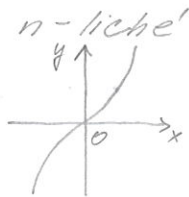
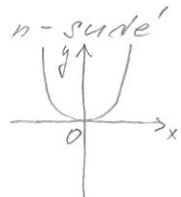


- 2vl. případ: nepřímá úměrnost $y = \frac{k}{x}$, $k \in \mathbb{R} - \{0\}$

Mocninná funkce $y = x^n$

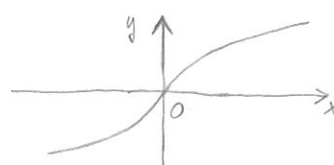
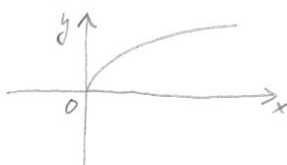
- $n \in \mathbb{N}$; $D(f) = \mathbb{R}$
- graf: parabola n-tého stupně

- $n \in \mathbb{Z}^-$; $D(f) = \mathbb{R} - \{0\}$
- graf: hyperbola n-tého stupně



n-tá odmocnina $y = \sqrt[n]{x}$

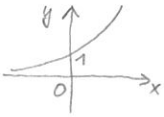
- $n \in \mathbb{N}$; $n \geq 2$; graf: parabola n-tého stupně
- n sudé, $D(f) = \mathbb{R}_0^+$
- n liché, $D(f) = \mathbb{R}$



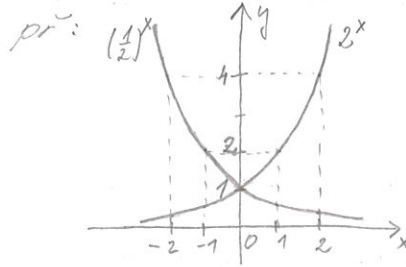
Exponenciální funkce $y = a^x$

- $a > 0, a \neq 1, a \in \mathbb{R}; D(f) = \mathbb{R}, H(f) = \mathbb{R}^+$

- $a > 1$



$0 < a < 1$



x	-2	-1	0	1	2
2^x	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4
$(\frac{1}{2})^x$	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$

- $\forall x_1, x_2 \in \mathbb{R}: a^{x_1} \cdot a^{x_2} = a^{x_1+x_2}$

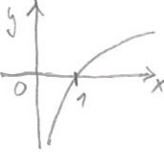
$$\frac{a^{x_1}}{a^{x_2}} = a^{x_1-x_2}$$

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

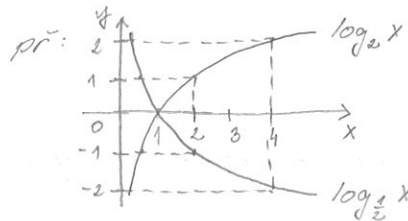
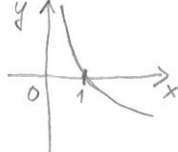
Logaritmická funkce $y = \log_a x \dots a^y = x$

- $a \in \mathbb{R}, a > 0, a \neq 1; D(f) = \mathbb{R}^+, H(f) = \mathbb{R}$

- $a > 1$



$0 < a < 1$



x	1	2	4	$\frac{1}{2}$
$\log_2 x$	0	1	2	-1
$\log_{\frac{1}{2}} x$	0	-1	-2	1

- přirozený logaritmus: $\ln x = \log_e x \dots e = 2,71$

- dekadický logaritmus: $\log x = \log_{10} x$

- $\forall x_1, x_2 \in \mathbb{R}^+: \log_a x_1 + \log_a x_2 = \log_a (x_1 \cdot x_2)$

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

$$\log_a x_1^k = k \cdot \log_a x_1, k \in \mathbb{R}$$

Goniometrické funkce

• sinus $y = \sin x$

- $D(f) = \mathbb{R}, H(f) = (-1, 1)$

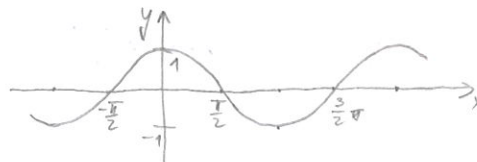
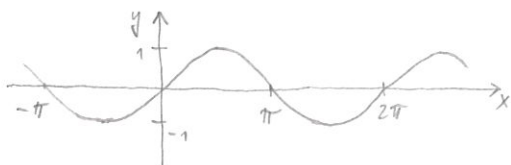
- lichá

- periodická na \mathbb{R} s periodou 2π ($\sin x$ i $\cos x$)

• kosinus $y = \cos x$

- $D(f) = \mathbb{R}, H(f) = (-1, 1)$

- sudá

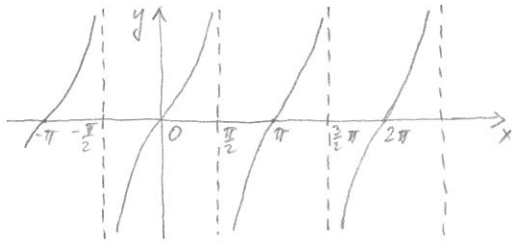


• tangens $y = \operatorname{tg} x = \frac{\sin x}{\cos x}$

- $D(f) = \mathbb{R} - \{(2k+1)\frac{\pi}{2}; k \in \mathbb{Z}\}$

$H(f) = \mathbb{R}$

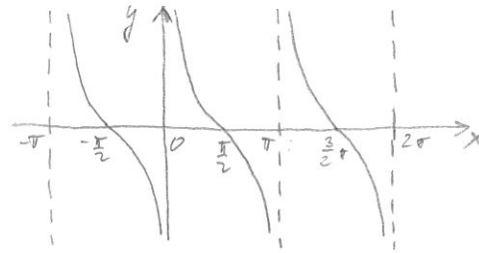
- lichý; periodická na \mathbb{R} s periodou π ($\operatorname{tg} x$ i $\operatorname{cotg} x$)



• kotangens $y = \operatorname{cotg} x = \frac{\cos x}{\sin x}$

- $D(f) = \mathbb{R} - \{k\pi; k \in \mathbb{Z}\}$

$H(f) = \mathbb{R}$



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

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

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

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

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

x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3}{2}\pi$
sin x	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1
cos x	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0
tg x	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	X	0	X
cotg x	X	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	X	0