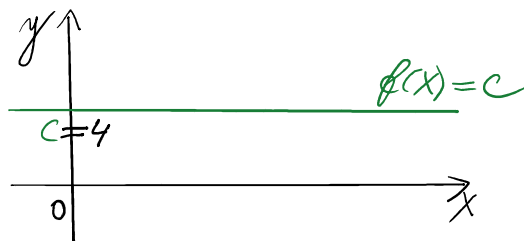


KONŠTANTNÁ FUNKCIA

$$f(x) = c$$

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

$$H(f) = \{c\}$$



$$PR: f(x) = 4$$

MOCHINOVÁ FUNKCIA

$$f(x) = x^n \quad n \in \mathbb{N} \quad D(f) = \mathbb{R}$$

$$n - \text{párne} \quad H(f) = \langle 0, \infty \rangle$$

$$\checkmark \text{ funkcia je párna}$$

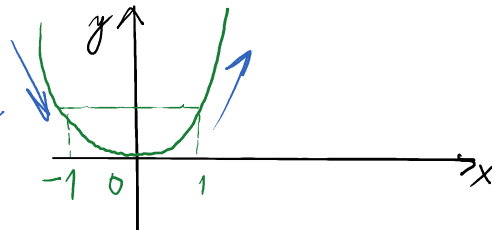
$$f(-x) = (-x)^n = x^n = f(x)$$

$$\checkmark \text{ nie je monotónna na } D(f)$$

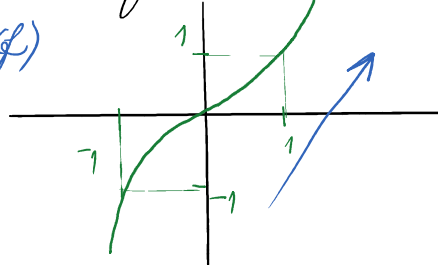
$$x \in (-\infty, 0) \rightarrow$$

$$x \in (0, \infty) \rightarrow$$

$$PR: f(x) = x^2 \quad (x^4, x^6, \dots)$$



$$PR: f(x) = x^3 \quad (x^5, x^7, \dots)$$



$$n - \text{nepárne} \quad H(f) = \mathbb{R}$$

$$\checkmark \text{ funkcia je nepárna}$$

$$f(-x) = (-x)^3 = -x^3 = -f(x)$$

$$\checkmark \text{ rastúca na } D(f)$$

FUNKCIA n-tá ODMOCHINÁ

$$f(x) = \sqrt[n]{x} = x^{1/n} \quad n \in \mathbb{N}$$

$$n - \text{párne}$$

$$D(f) = \langle 0, \infty \rangle$$

$$H(f) = \langle 0, \infty \rangle$$

$$\checkmark \text{ rastúca}$$

$$PR: f(x) = x^2 \rightarrow f^{-1}(x) = \sqrt{x}$$

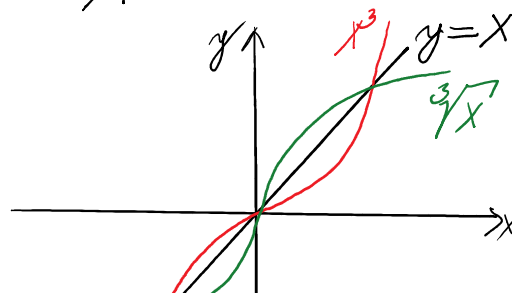


$$n - \text{nepárne}$$

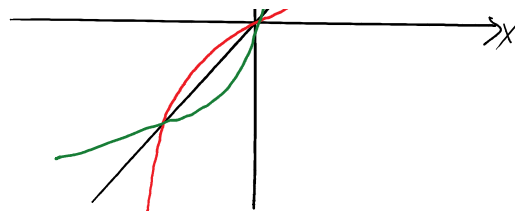
$$D(f) = \mathbb{R}$$

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

$$\checkmark \text{ rastúca}$$



✓ rastúca
✓ nepárna
 $f(-x) = \sqrt[3]{-x} = -\sqrt[3]{x} = -f(x)$

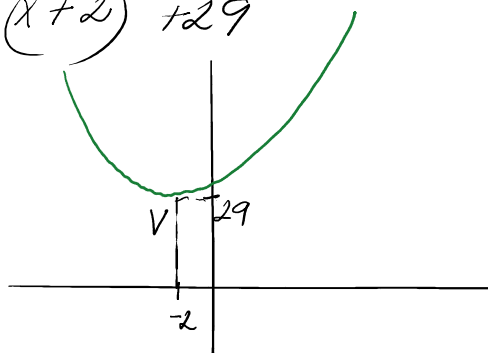


ALGEBRICKÝ POLYNÓM STUPŇA n

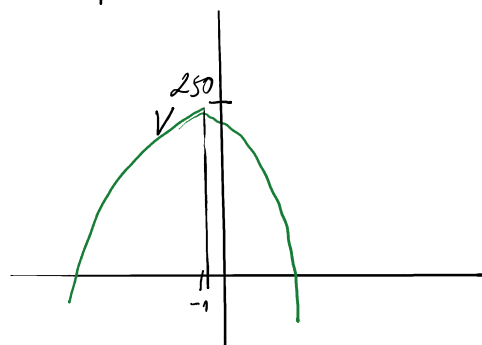
$$f(x) = a_0 x^n + a_1 x^{n-1} + \dots + a_{n-1} x + a_n \quad n \in \mathbb{N}$$

$$D(f) = \mathbb{R} \quad H(f) ?$$

PR: $f(x) = x^2 + 4x + 33 = (x+2)^2 + 29$
 $V[-2, 29]$



PR: $f(x) = 249 - 2x - x^2 = 250 - (x+1)^2$
 $V[-1, 250]$



RACIONÁLNÁ FUNKCIA

$$f(x) = \frac{p(x)}{q(x)} \quad D(f): q(x) \neq 0 \quad H(f) ?$$

LINEÁRNA LOMENÁ FUNKCIA

$$f(x) = \frac{ax+b}{cx+d}$$

$$a \cdot d - b \cdot c \neq 0$$

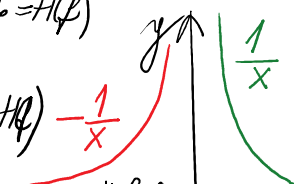
$$D(f): cx+d \neq 0$$

$$x \neq -\frac{d}{c}$$

$$\frac{4x+2}{2x+1} = 2$$

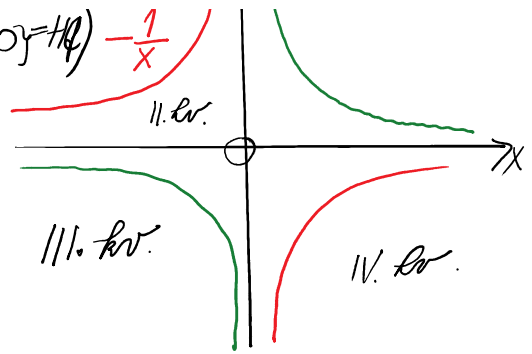
PR: $f(x) = \frac{1}{x} \quad D(f) = \mathbb{R} \setminus \{0\} = H(f)$

PR: $f(x) = -\frac{1}{x} \quad D(f) = \mathbb{R} \setminus \{0\} = H(f)$



1. kv.

PR: $f(x) = -\frac{1}{x}$ $D(f) = \mathbb{R} - \{0\} = H(f)$ $-\frac{1}{x}$



PR. $f(x) = \frac{3+x}{2-x} =$

$$= -\frac{-3-x}{2-x} =$$

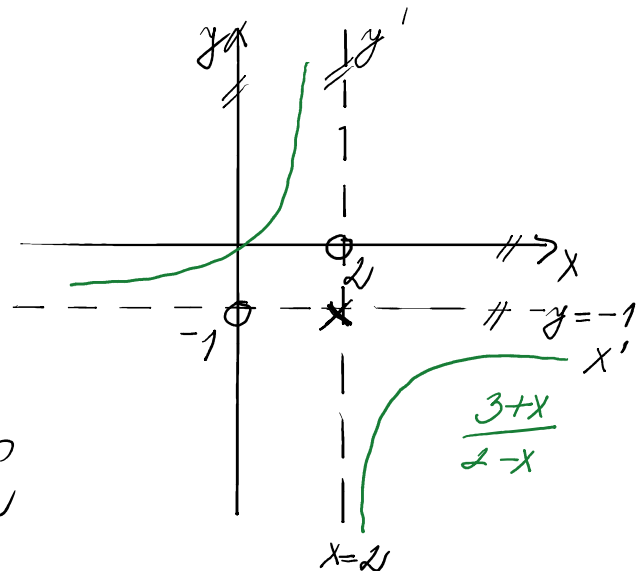
$$= -\frac{2-x-5}{2-x} =$$

$$= -\frac{2-x}{2-x} + \frac{5}{2-x} =$$

$$= \textcircled{-1} + \textcircled{\frac{5}{x-2}}$$

$$D(f) = \mathbb{R} - \{2\} \quad x-2 \neq 0$$

$$H(f) = \mathbb{R} - \{-1\} \quad x \neq 2$$



EXPONENCIÁLNÁ FUNKCIA

$$f(x) = a^x \quad a > 0 \quad a \neq 1$$

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

$$H(f) = (0, \infty) = D(f^{-1})$$

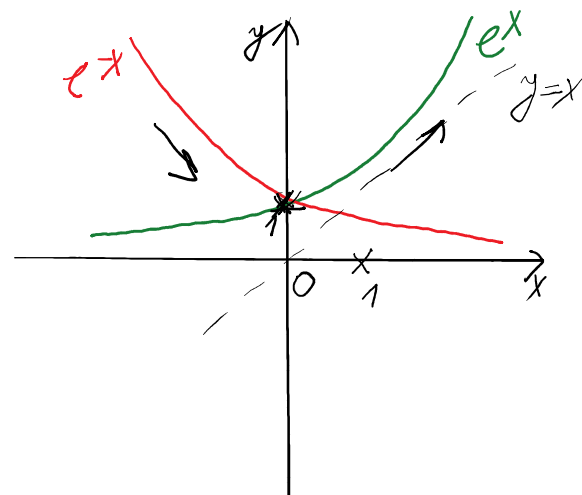
$a > 1$ rastúca

$0 < a < 1$ klesajúca

PR. $f(x) = e^x$ ($e \approx 2.7 > 1$)

$$f(x) = \left(\frac{1}{e}\right)^x = (e^{-1})^x \quad \frac{1}{e} < 1$$

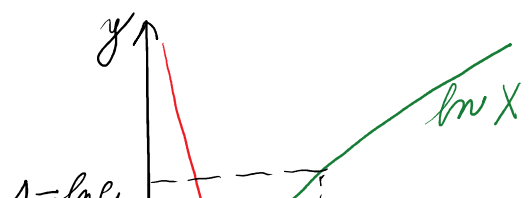
$$= e^{-x}$$



LOGARITMICKÁ FUNKCIA

$$f(x) = \log_a x \quad a > 0 \quad a \neq 1$$

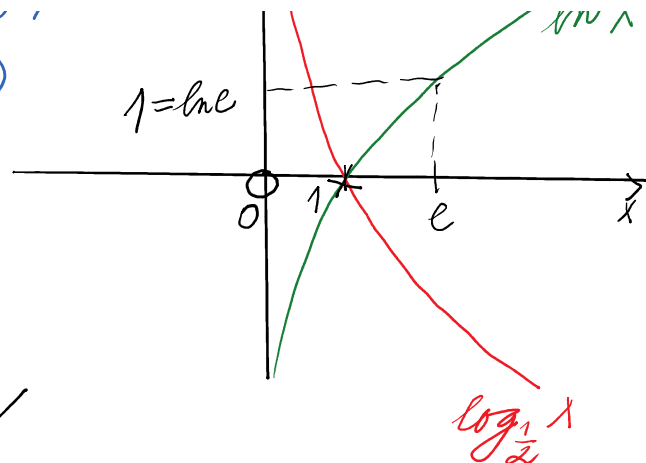
$$D(f) = (0, \infty)$$



$$f(x) = \log_a x$$

$$D(f) = (0, \infty)$$

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



$a > 1$ rastúca
 $0 < a < 1$ klesajúca

PR: $f(x) = \log_e x = \ln x \checkmark$

PR: $f(x) = \log_{\frac{1}{2}} x$

$f(x) = \ln x$ prirodzený logaritmus
 $f(x) = \log_{10} x = \log x$ dekadický logaritmus

PLATÍ: $\log_a 1 = 0$
 $\log_a a = 1$

$$\log_a x + \log_a y = \log_a x \cdot y$$

$$\log_a x - \log_a y = \log_a \frac{x}{y}$$

$$\log_a x^n = n \cdot \log_a x$$

LOGARITMICKÁ FUNKCIA JE INVERZNOU K EXPONENCIÁLNEJ FUNKCII A NAOPAK

GONIOMETRICKÉ FUNKCIE

$$f(x) = \sin x$$

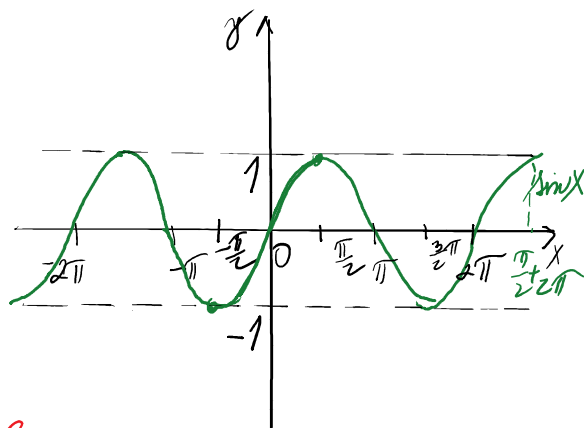
$$D(f) = \mathbb{R}$$

$$H(f) = [-1, 1]$$

- ✓ nie je monotónna na $D(f)$
- ✓ nepárna $\sin(-x) = -\sin x$
- ✓ periodická $p = 2\pi$

$$\sin(x + 2\pi) = \sin x$$

$$\sin(x + 2k\pi) = \sin x \quad k \in \mathbb{Z}$$

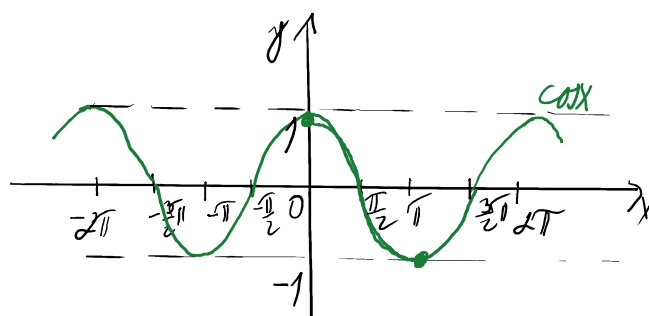


$$f(x) = \cos x$$

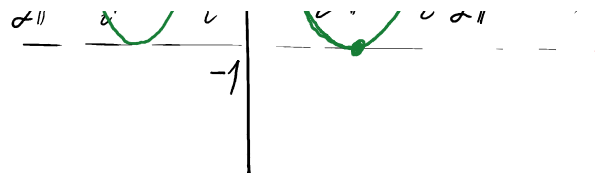
$$D(f) = \mathbb{R}$$

$$H(f) = [-1, 1]$$

- ✓ nie je monotónna na $D(f)$
- ✓ párna $\cos(-x) = \cos x$
- ✓ periodická $p = 2\pi$



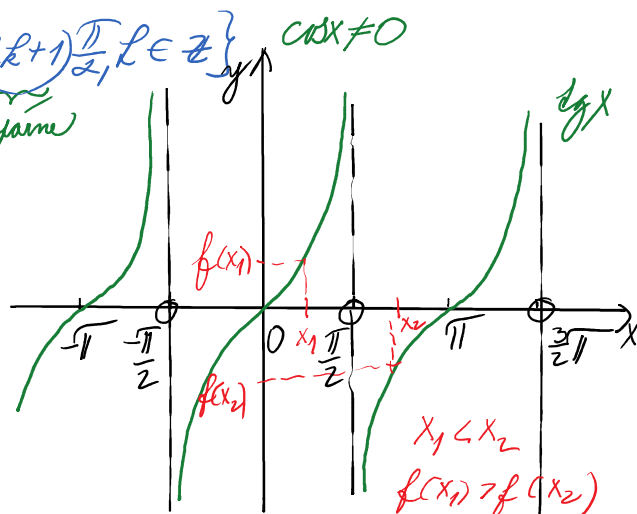
- ✓ *parná* $\cos(-x) = \cos x$
- ✓ *periodická* $\mu = 2\pi$
 $\cos(x + 2\pi) = \cos x$



$$f(x) = \operatorname{tg} x = \frac{\sin x}{\cos x} \quad D(f) = \mathbb{R} - \left\{ x = (2k+1)\frac{\pi}{2}, k \in \mathbb{Z} \right\} \quad \cos x \neq 0$$

neparná

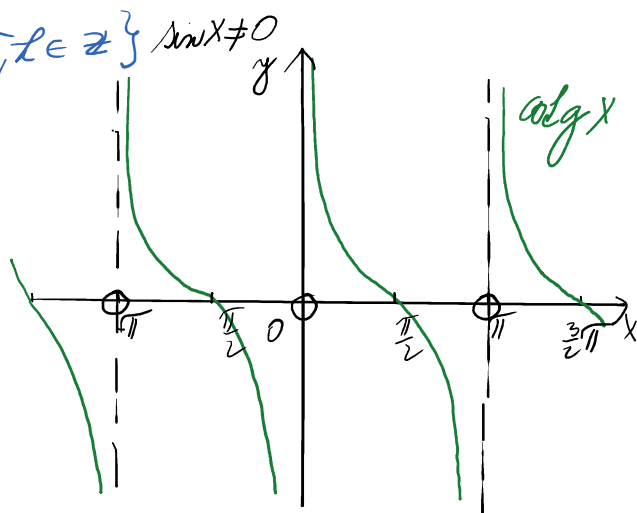
- ✓ *nie je monotónna na $D(f)$*
- ✓ *nepárna* $\operatorname{tg}(-x) = -\operatorname{tg} x$
- ✓ *periodická* $\mu = \pi$
 $\operatorname{tg}(x + \pi) = \operatorname{tg} x$



$$f(x) = \operatorname{cotg} x = \frac{\cos x}{\sin x} \quad D(f) = \mathbb{R} - \{ x = k\pi, k \in \mathbb{Z} \} \quad \sin x \neq 0$$

parná

- ✓ *nie je monotónna na $D(f)$*
- ✓ *parná* $\operatorname{cotg}(-x) = -\operatorname{cotg} x$
- ✓ *periodická* $\mu = \pi$
 $\operatorname{cotg}(x + \pi) = \operatorname{cotg} x$



ZLOŽENÁ FUNKCIA

$$\left. \begin{array}{l} y = f(x) \\ x = g(y) \end{array} \right\} \quad x = g(f(x))$$

$$\begin{array}{ll} f & y = \cos x \\ g & y = x^2 \end{array}$$

$$\begin{array}{l} f(g(x)) \\ g(f(x)) \end{array}$$

$$\begin{aligned} f(g(x)) &= \cos(x^2) \quad \text{vnútorná} \\ g(f(x)) &= (\cos x)^2 = \cos^2 x \quad \text{vnútorná} \end{aligned}$$

vnútorná

