

Hyperbolické Funkce

MB202

Jaro 2015

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sinh(x)

$$\sinh(x) = \frac{e^x - e^{-x}}{2} = \frac{e^{2x} - 1}{2e^x}$$

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

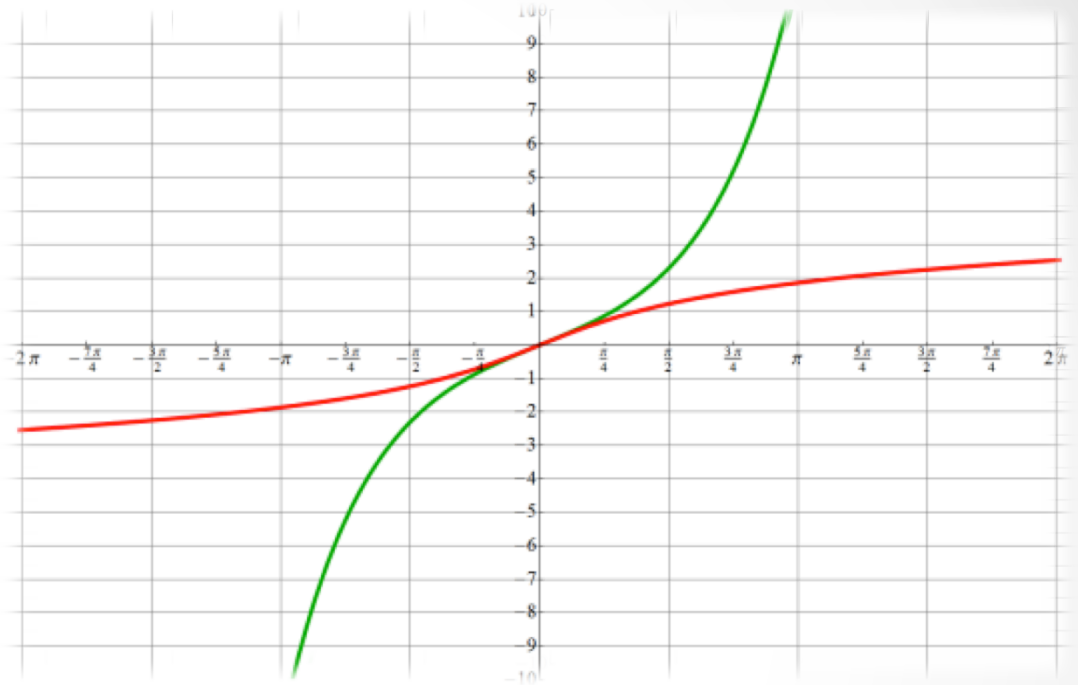
$$H(\sinh) = \mathbb{R}$$

argsinh(x)

$$\operatorname{argsinh}(x) = \ln(x + \sqrt{x^2 + 1})$$

$$D(\operatorname{argsinh}) = \mathbb{R}$$

$$H(\operatorname{argsinh}) = \mathbb{R}$$

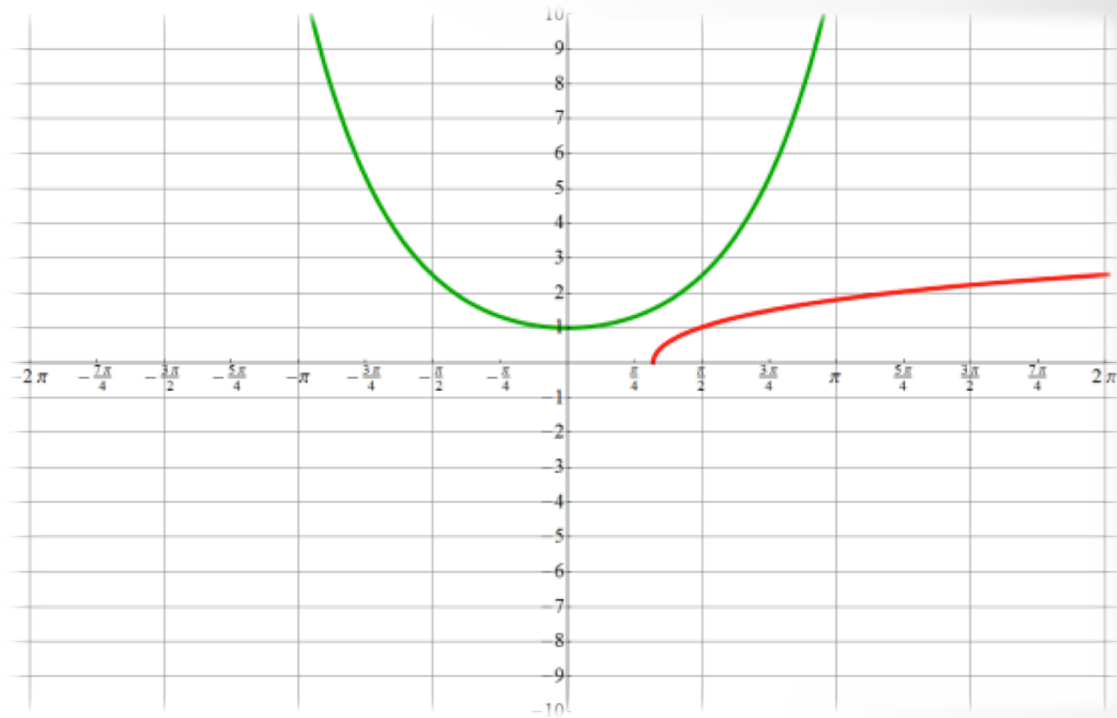


cosh(x)

$$\cosh(x) = \frac{e^x + e^{-x}}{2} = \frac{e^{2x} + 1}{2e^x}$$

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

$$H(\cosh) = \langle 1, \infty \rangle$$



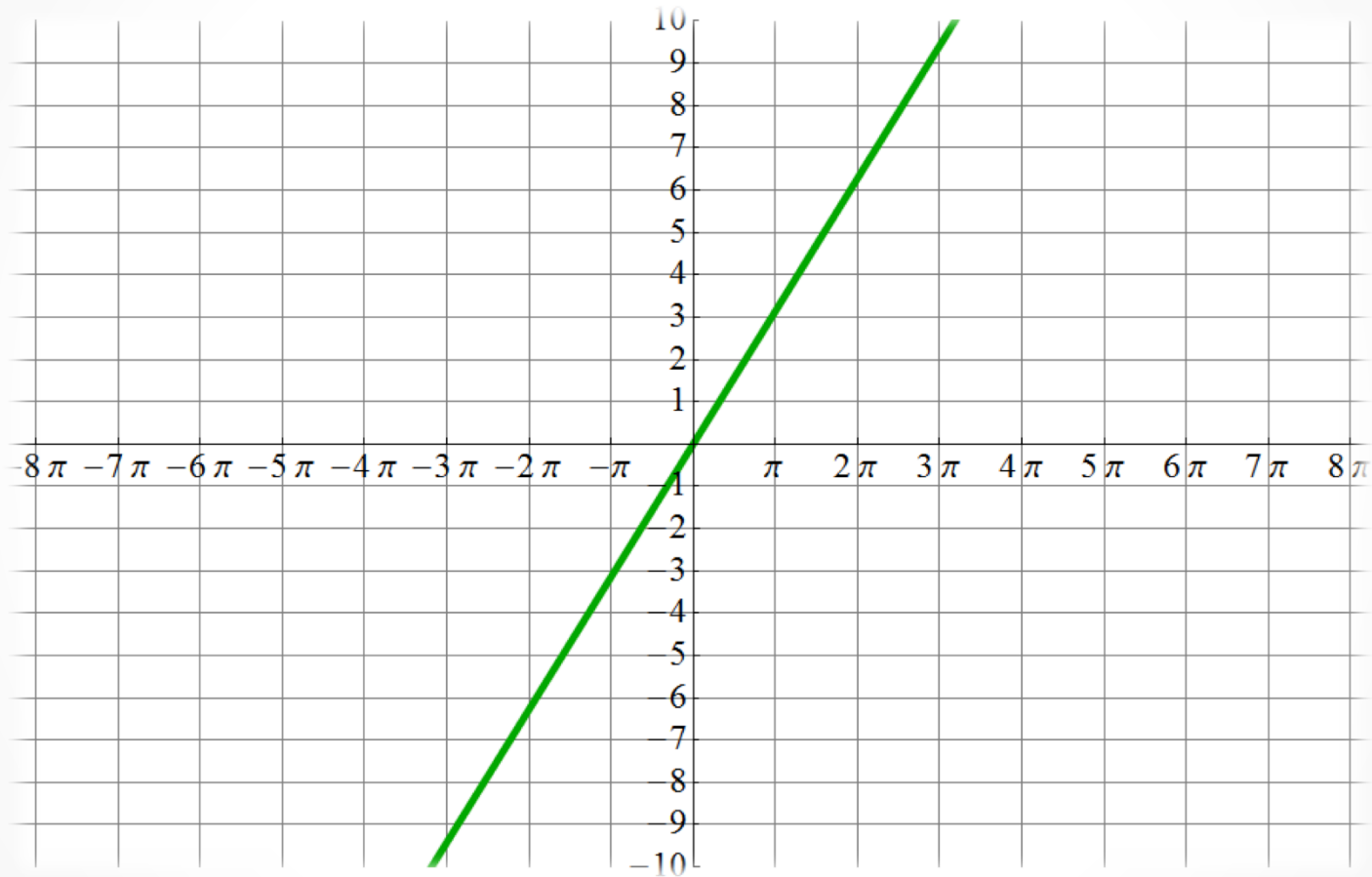
argcosh(x)

$$\operatorname{argcosh}(x) = \ln(x + \sqrt{x^2 - 1})$$

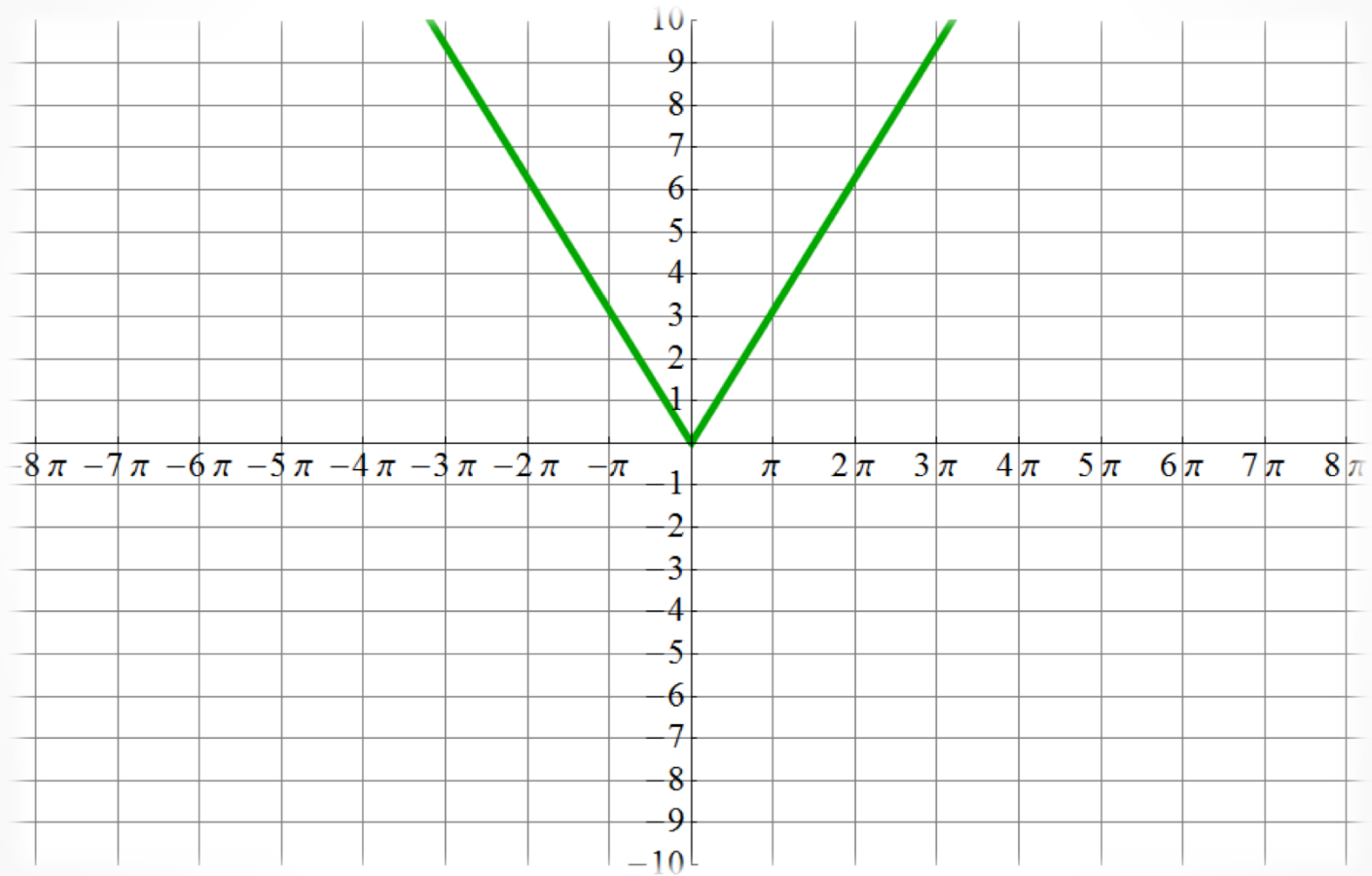
$$D(\operatorname{argcosh}) = \langle 1, \infty \rangle$$

$$H(\operatorname{argcosh}) = \langle 0, \infty \rangle$$

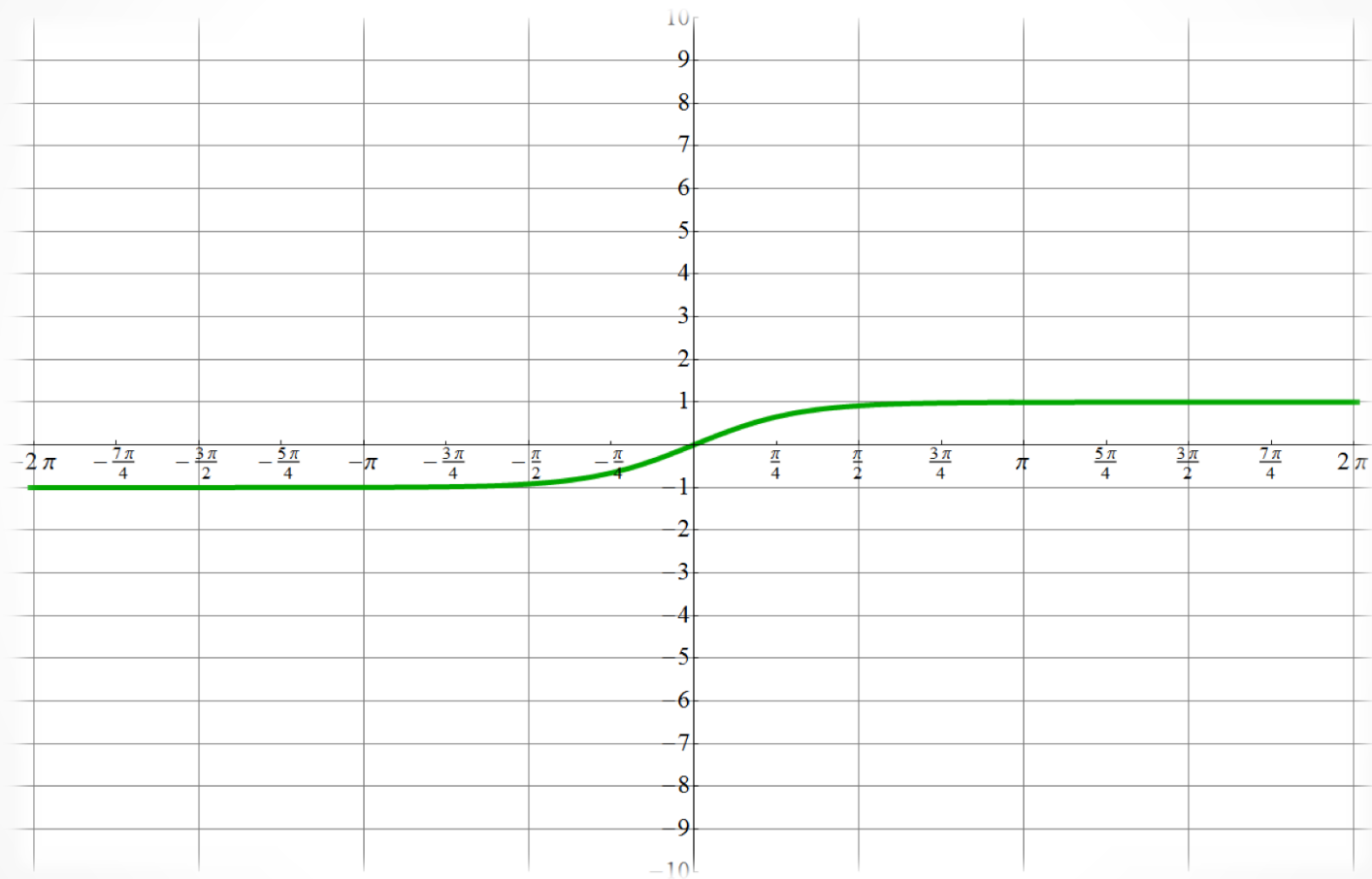
$\operatorname{argsinh}(\sinh(x))$



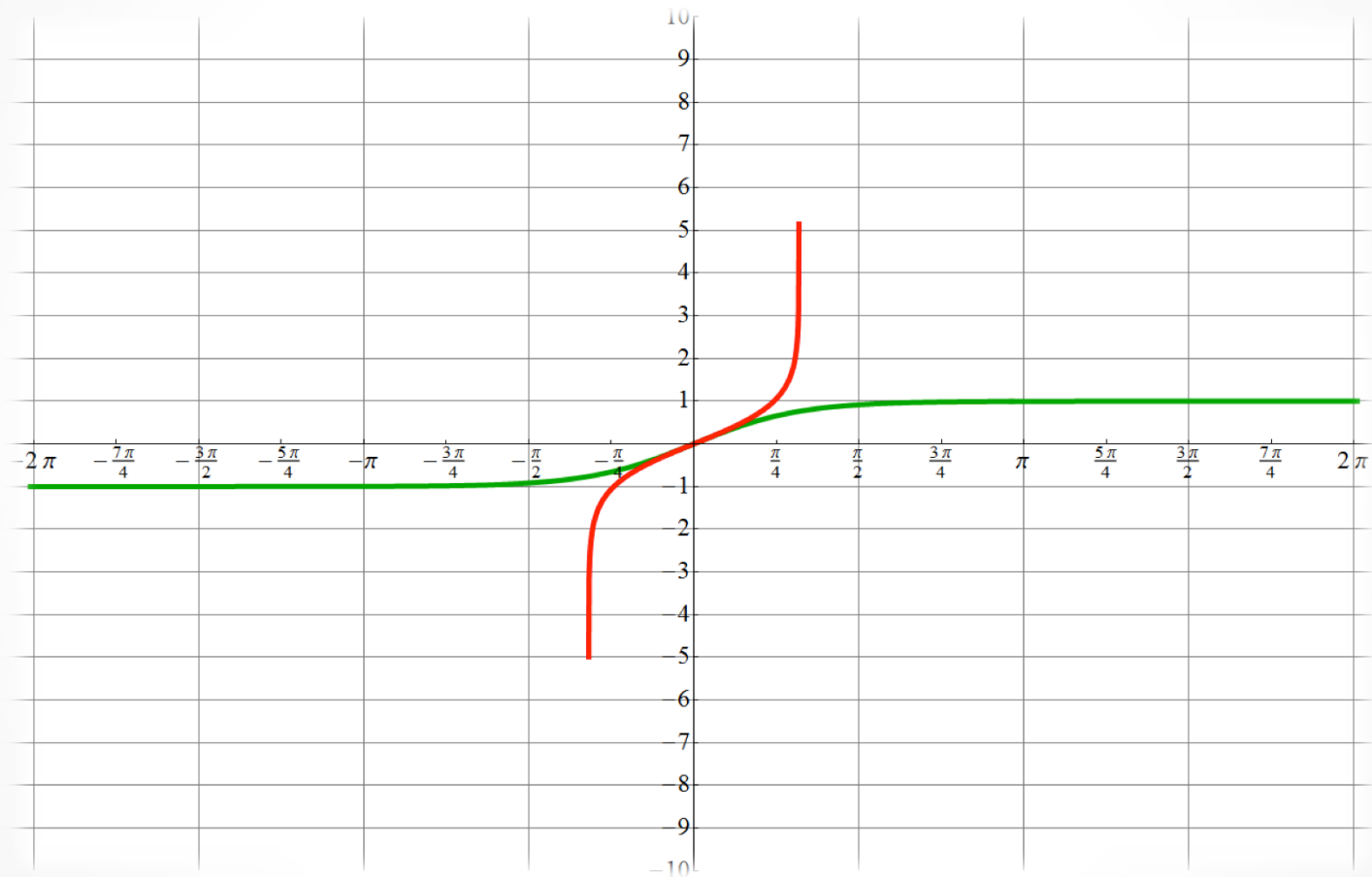
$\operatorname{argcosh}(\cosh(x))$



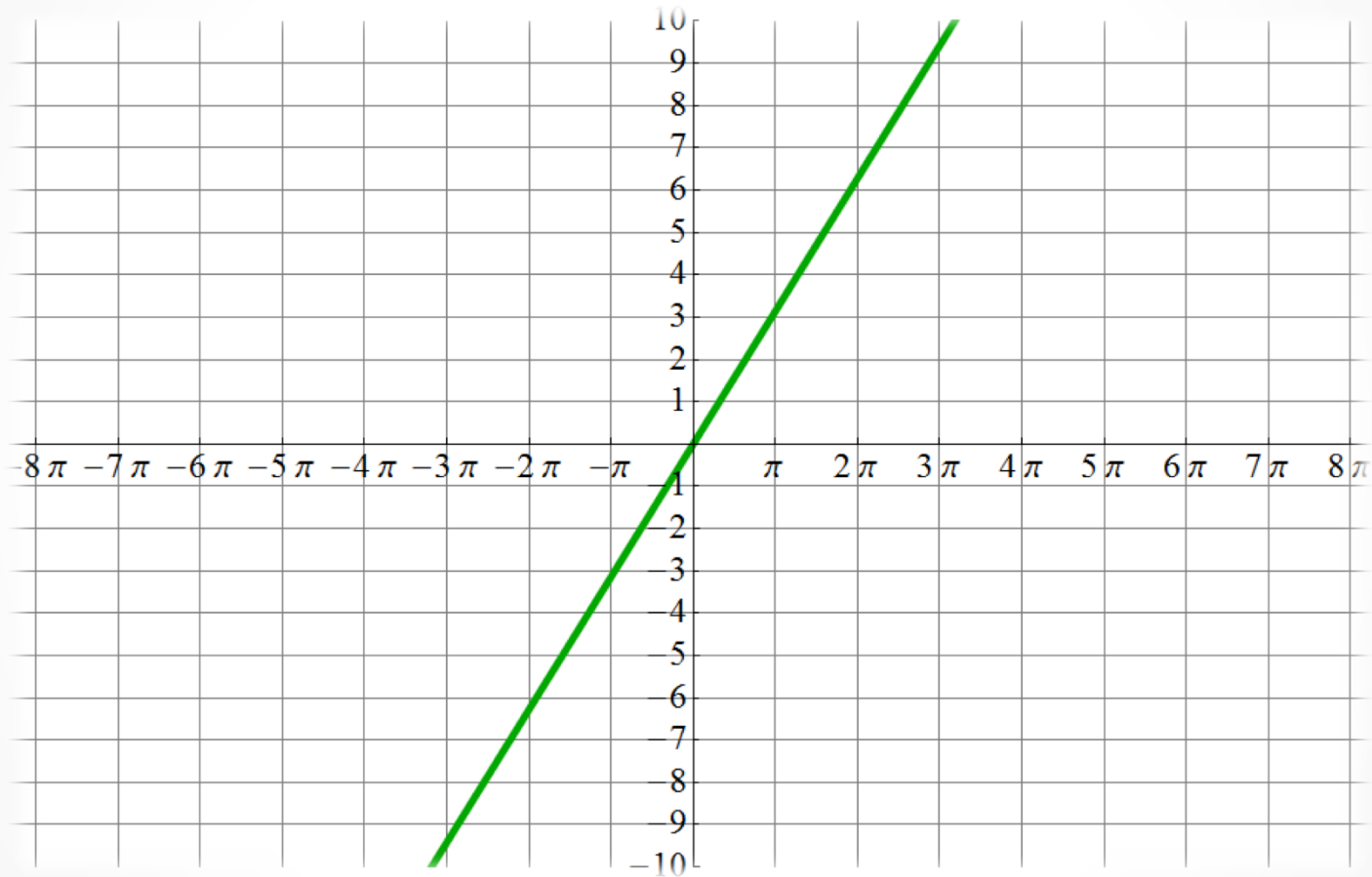
tgh(x)



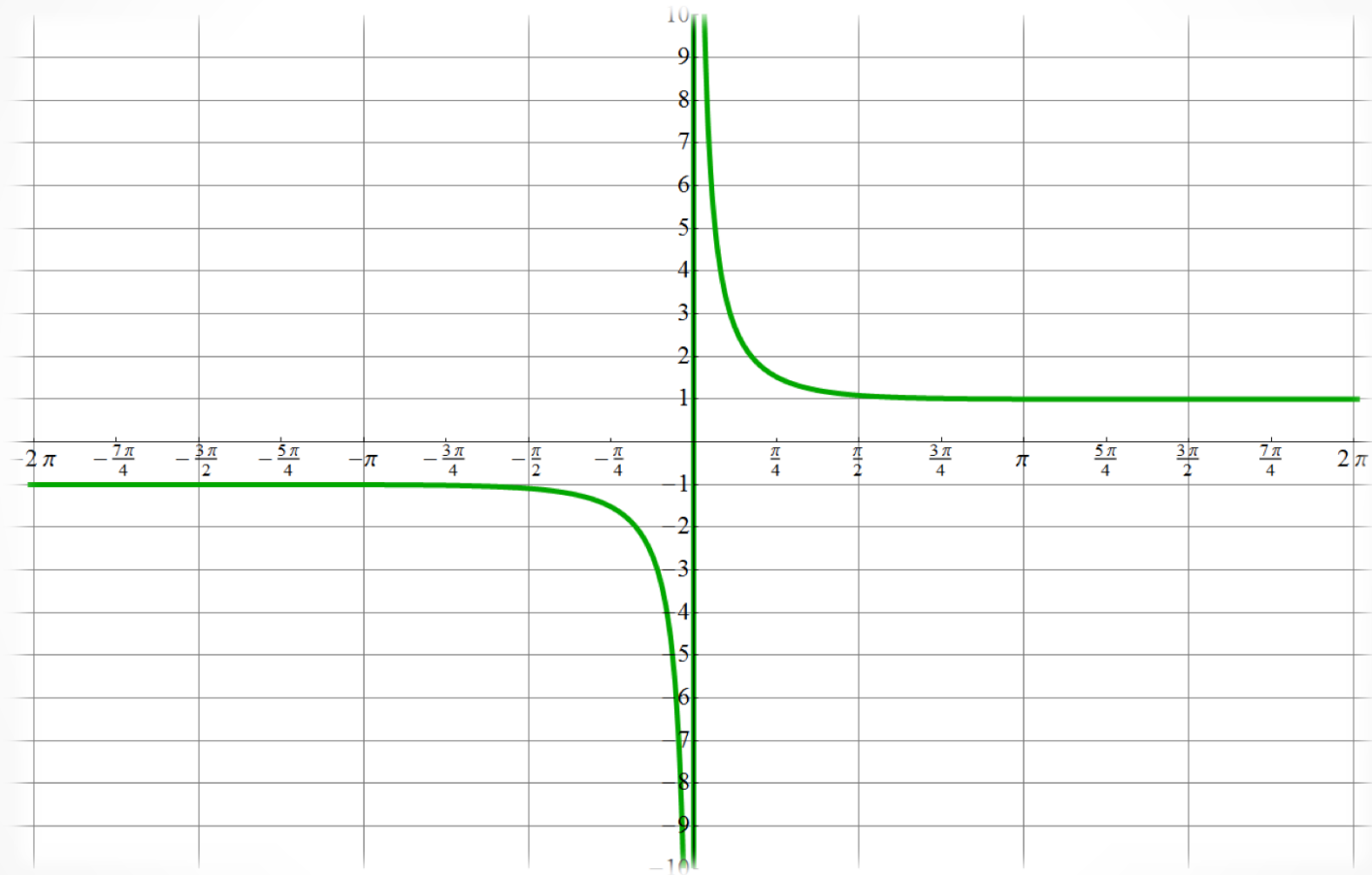
tgh(x) argtgh(x)



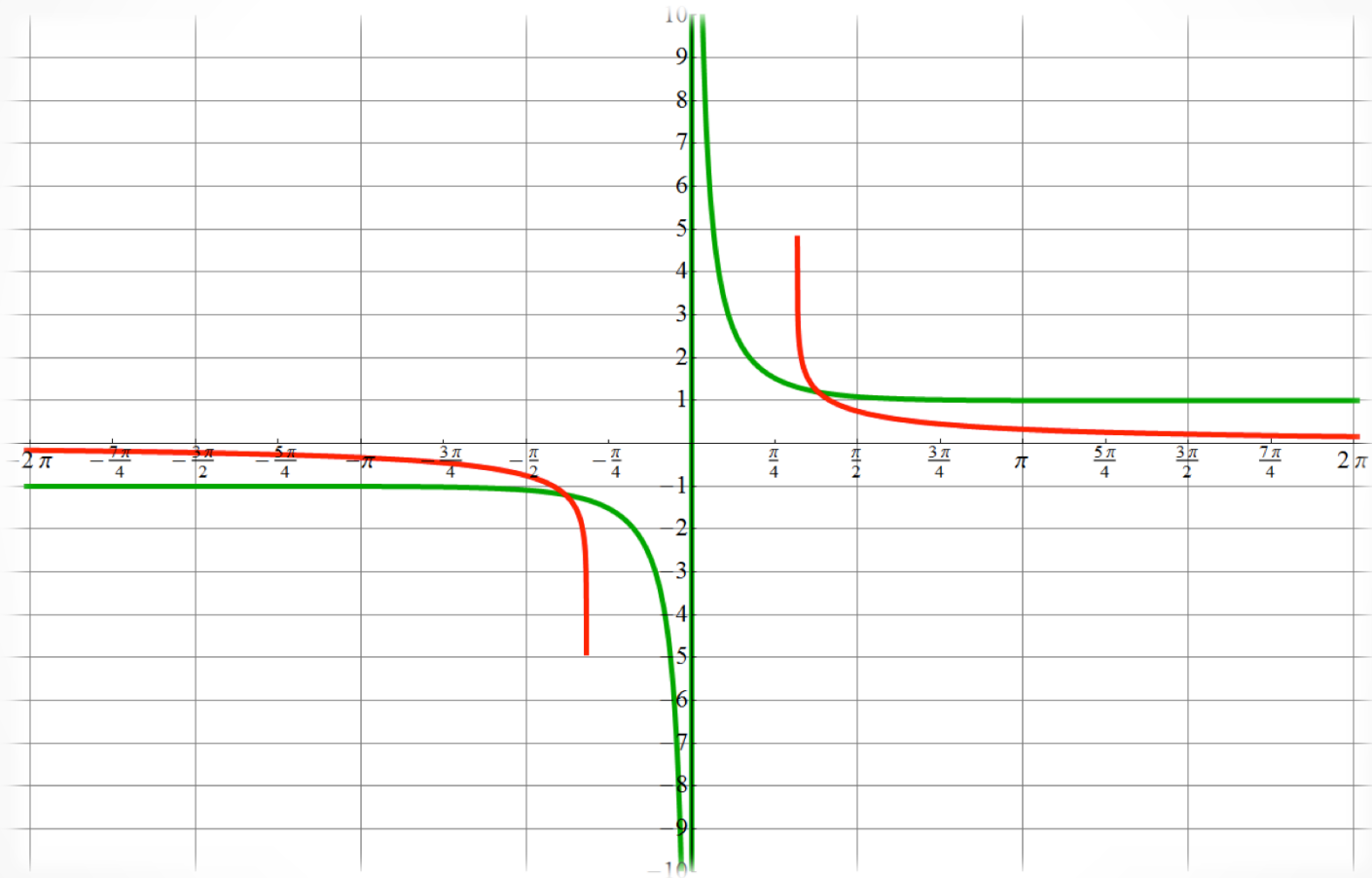
$\operatorname{argtgh}(\operatorname{tgh}(x))$



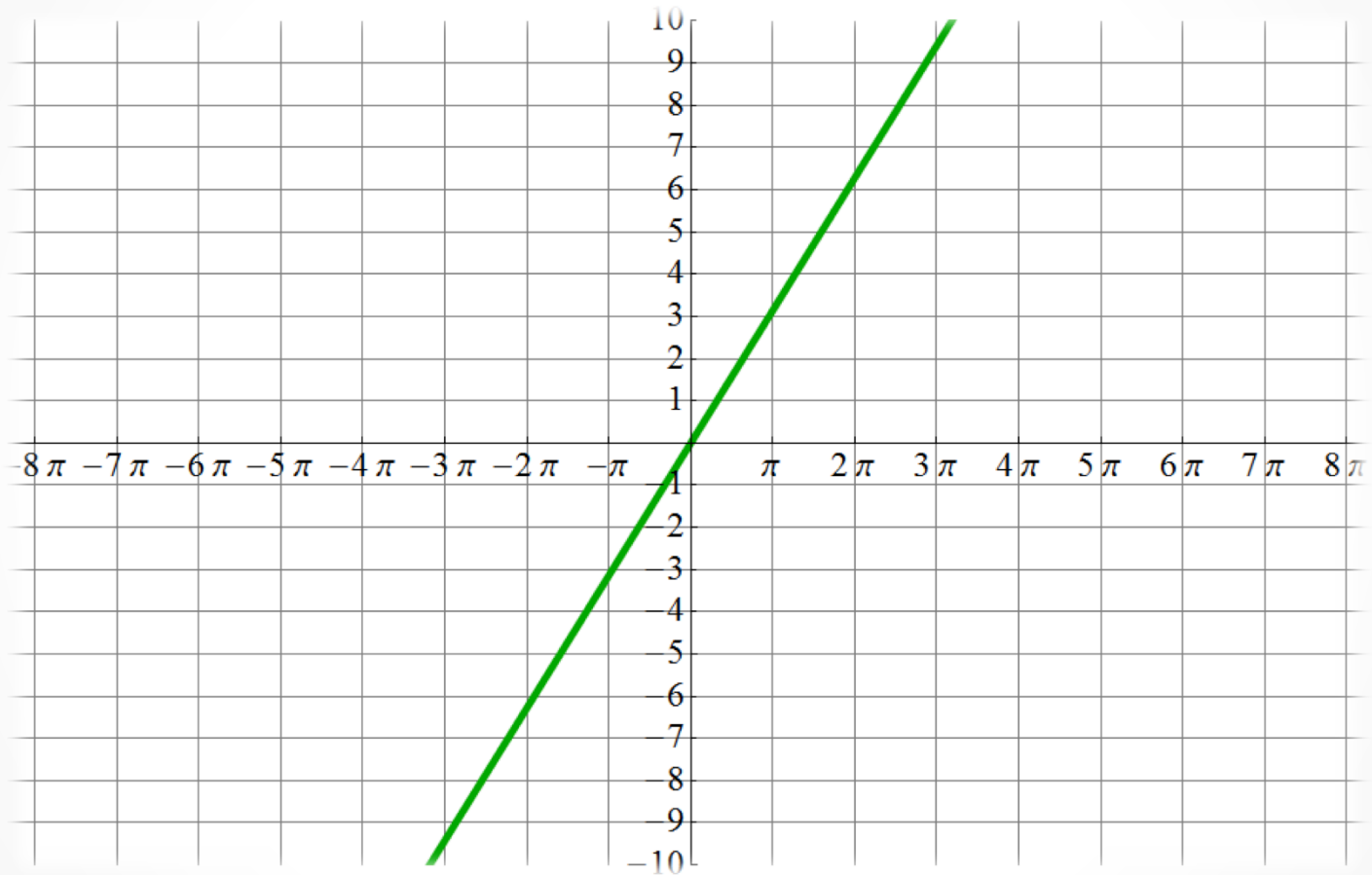
$\operatorname{coth}(x)$



$\coth(x)$ $\operatorname{argcoth}(x)$



$\operatorname{argcoth}(\operatorname{coth}(x))$



vzorečky

$$\sinh(x \pm y) = \sinh(x) \cosh(y) \pm \cosh(x) \sinh(y)$$

$$\cosh(x \pm y) = \cosh(x) \cosh(y) \pm \sinh(x) \sinh(y)$$

$$\sinh(2x) = 2 \sinh(x) \cosh(x)$$

$$\cosh(2x) = \cosh^2(x) + \sinh^2(x)$$

$$\sinh^2(x) = \frac{1}{2}(\cosh(2x) - 1)$$

$$\cosh^2(x) = \frac{1}{2}(\cosh(2x) + 1)$$

$$\cosh^2(x) - \sinh^2(x) = 1$$

$$\operatorname{tgh}(x \pm y) = \frac{\operatorname{tgh}(x) \pm \operatorname{tgh}(y)}{1 \pm \operatorname{tgh}(x)\operatorname{tgh}(y)}$$

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

vztah k sin/cos

$$\sinh(x) = -i \sin(ix)$$

$$\cosh(x) = \cos(ix)$$

$$\operatorname{tgh}(x) = -i \operatorname{tg}(ix)$$

$$\operatorname{coth}(x) = i \operatorname{cot}(ix)$$

užití

- řetězovka
- fyzika
- tractrix

