

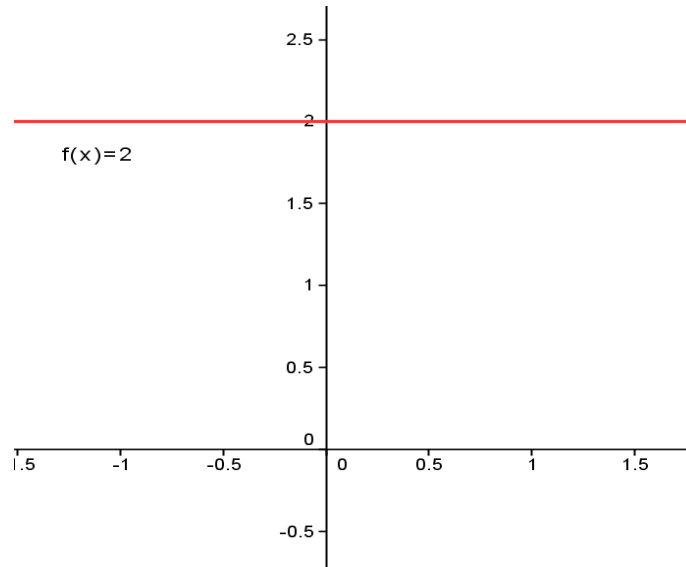
ELEMENTARY FUNCTIONS

Constant function

$$f(x) = k, k \in R$$

$$D(f) = R$$

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

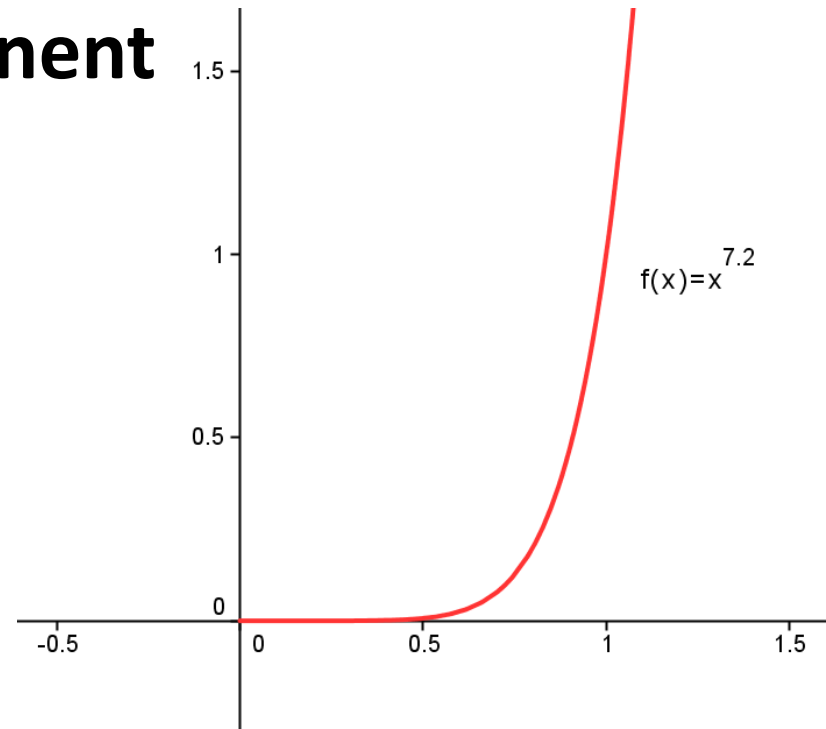


Power function with real exponent

$$f(x) = x^r, r \in R$$

$$D(f) = R^+$$

$$H(f) = R$$



Exponential function

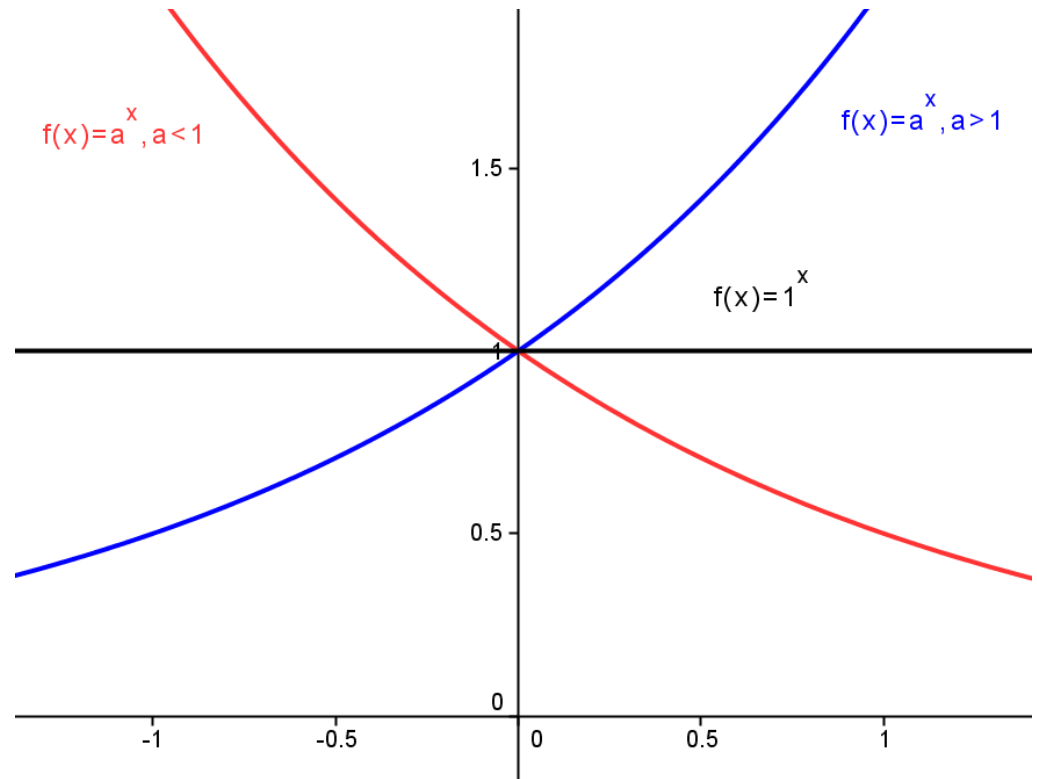
$$f(x) = a^x, a > 0$$

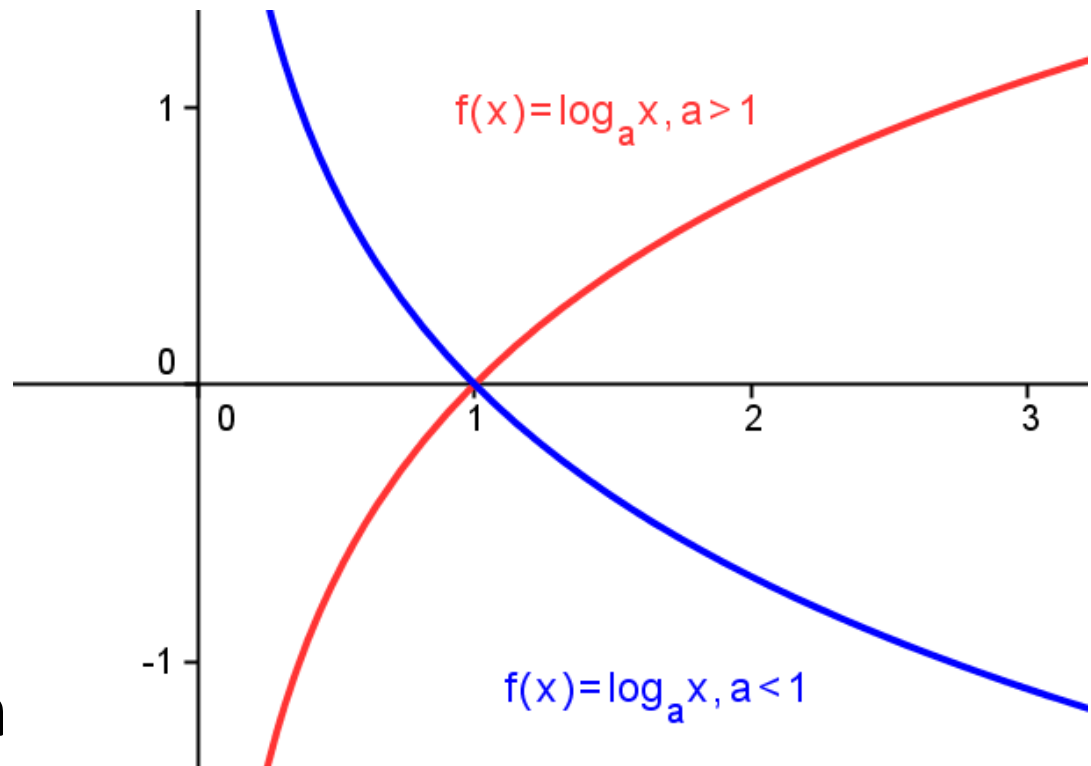
$$D(f) = \mathbb{R}, H(f) = \mathbb{R}^+$$

$a = 1$ – constant function

$0 < a < 1$ – decreasing function

$a > 1$ – increasing function





Logarithmic function

$$f(x) = \log_a x, a > 0$$

$$D(f) = R^+, H(f) = R$$

$a < 1$ – decreasing function

$a > 1$ – increasing function

inverse to exponential function

Trigonometric functions

Sine $f(x) = \sin x$

$D(f) = R$, $H(f) = \langle -1, 1 \rangle$, odd, period 2π

Cosine $f(x) = \cos x$

$D(f) = R$, $H(f) = \langle -1, 1 \rangle$, even, period 2π

Tangens $f(x) = \operatorname{tg} x$

$D(f) = R$, $x \neq (2k+1) \pi/2$, $H(f) = R$, odd, period π

Cotangens $f(x) = \operatorname{cotg} x$

$D(f) = R$, $x \neq k\pi$, $H(f) = R$, odd, period π

Cyclometric function - Arcsine

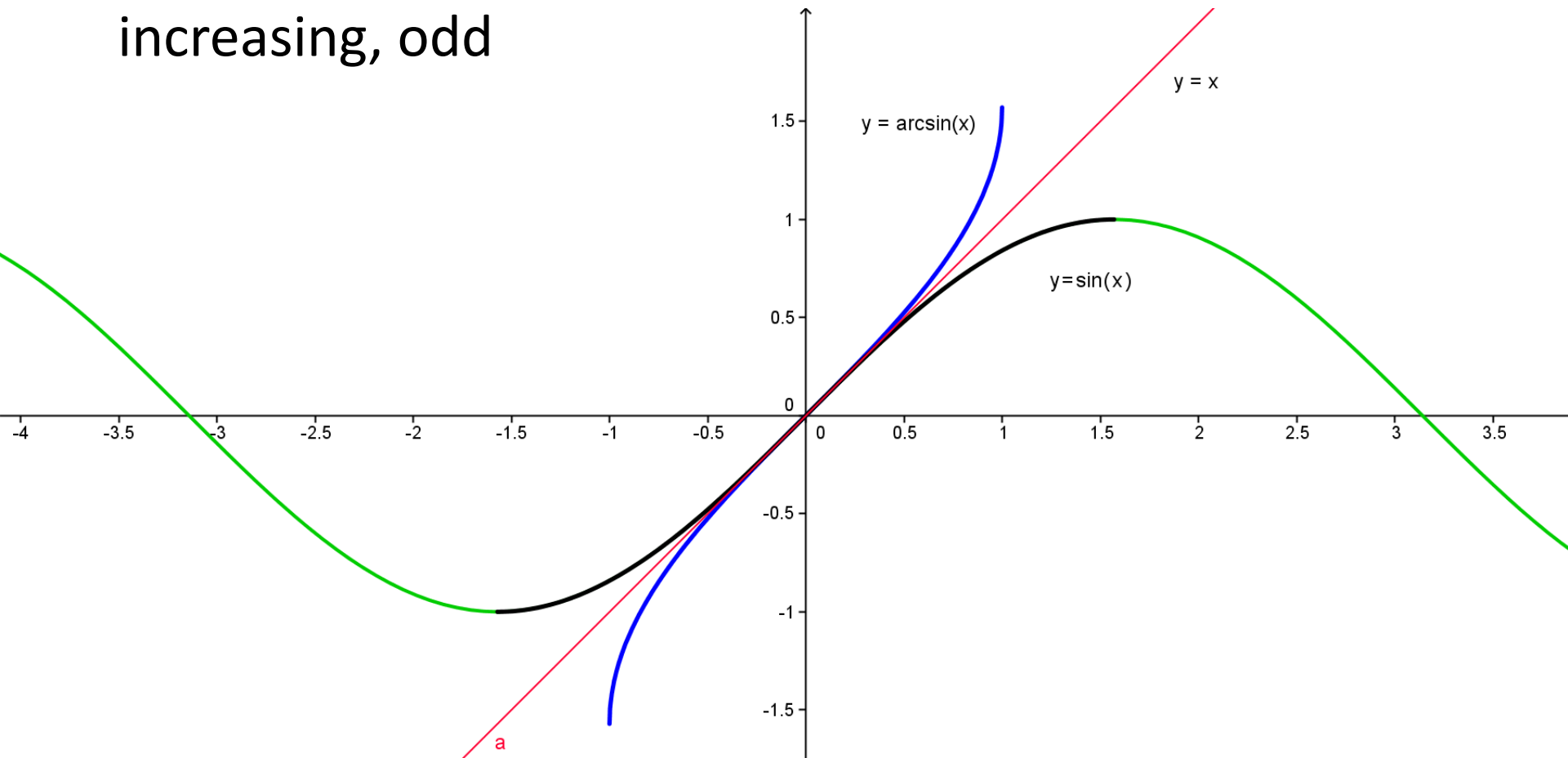
inverse function to function $y = \sin x$, $D(f) = \langle -\pi/2, \pi/2 \rangle$

arcsine

$$y = \arcsin x$$

$$D(f) = \langle -1, 1 \rangle, H(f) = \langle -\pi/2, \pi/2 \rangle$$

increasing, odd



Cyclometric function - Arccosine

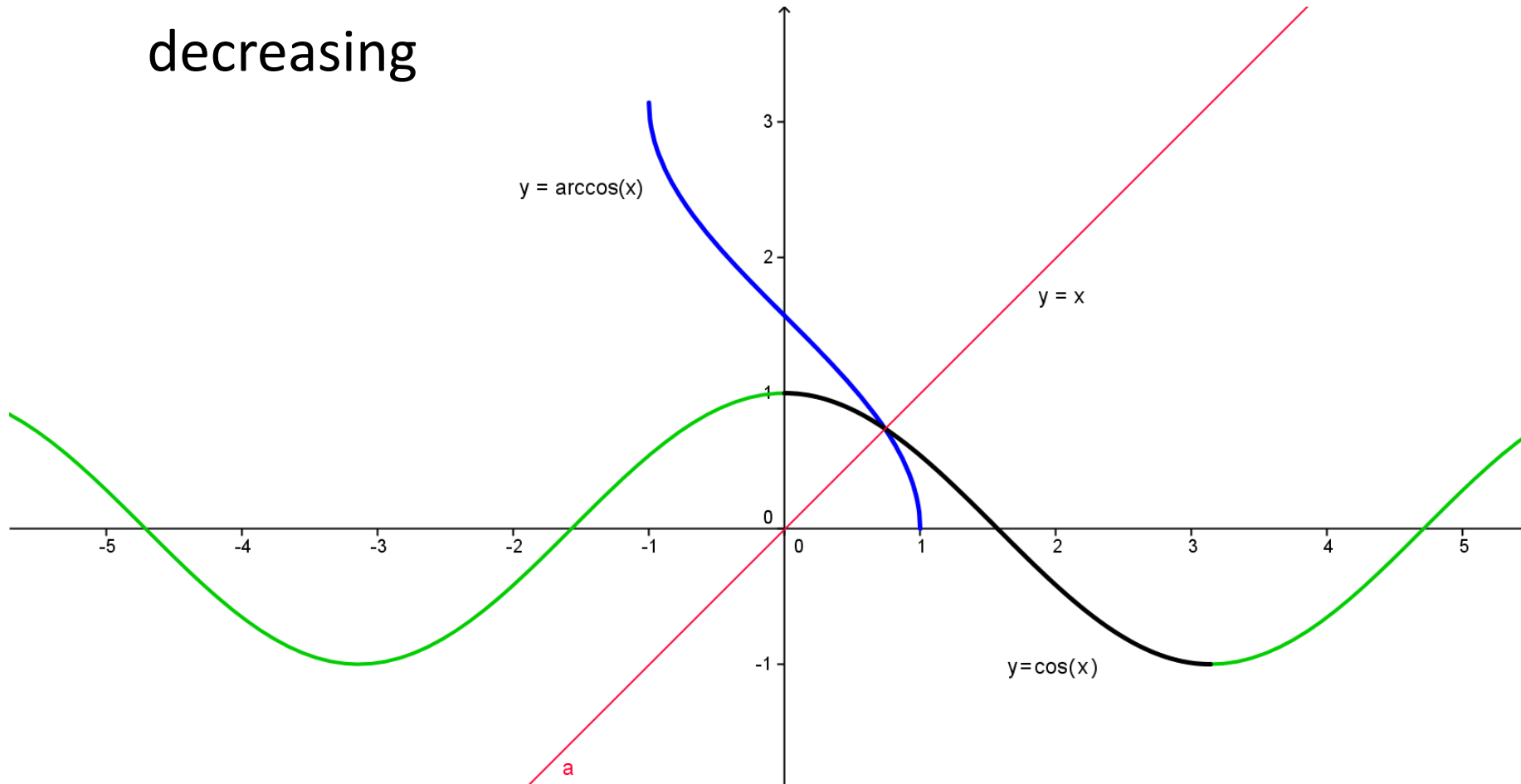
inverse function to function $y = \cos x, D(f) = <0, \pi>$

arccosine

$$y = \arccos x$$

$$D(f) = <-1, 1>, H(f) = <0, \pi>$$

decreasing



Cyclometric function - Arctangent

inverse function to function

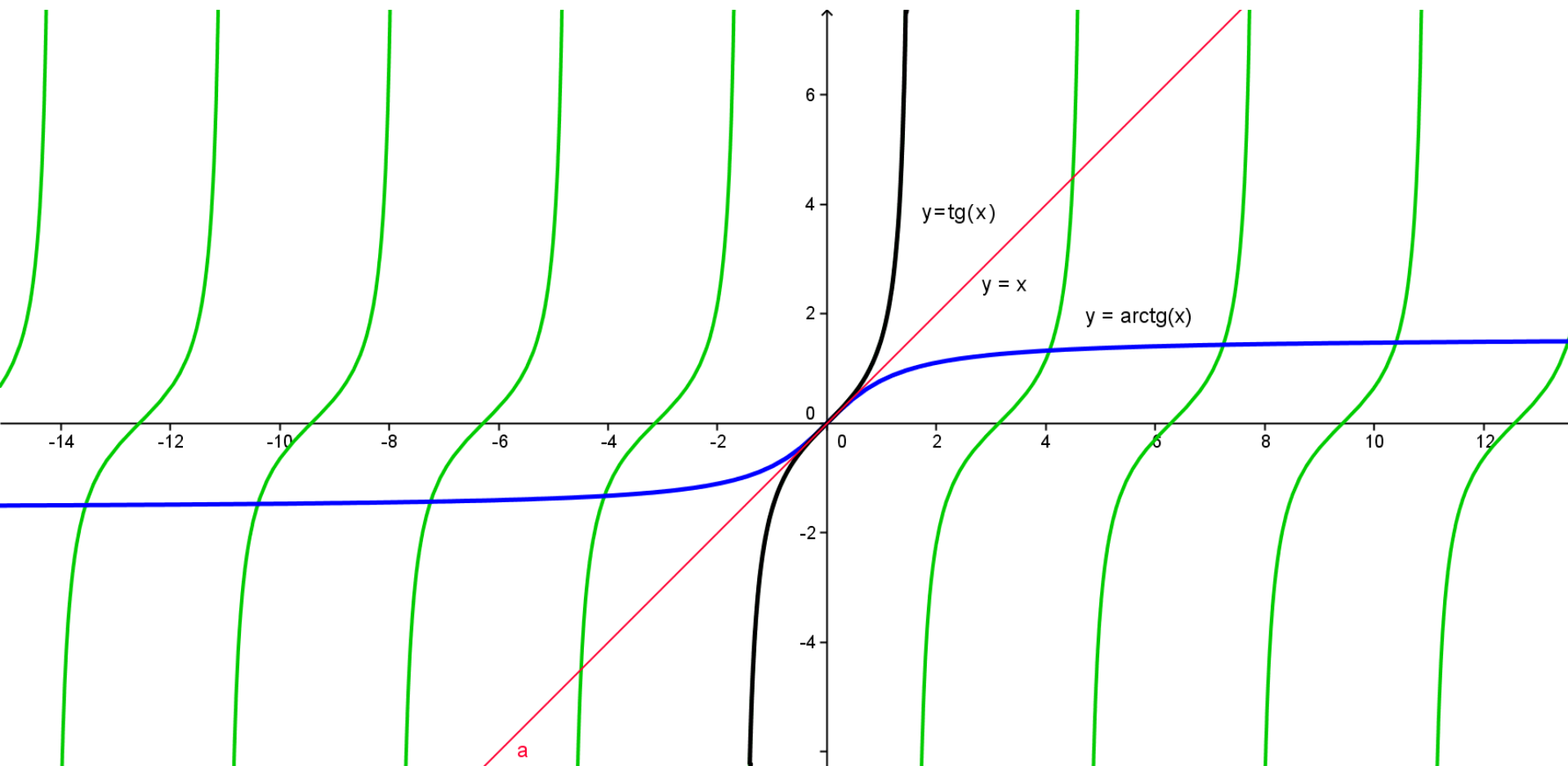
$$y = \operatorname{tg} x, D(f) = (-\pi/2, \pi/2)$$

arctangent

$$y = \operatorname{arctg} x$$

increasing, odd

$$D(f) = R, H(f) = (-\pi/2, \pi/2)$$



Cyclometric function - Arccotangent

inverse function to function

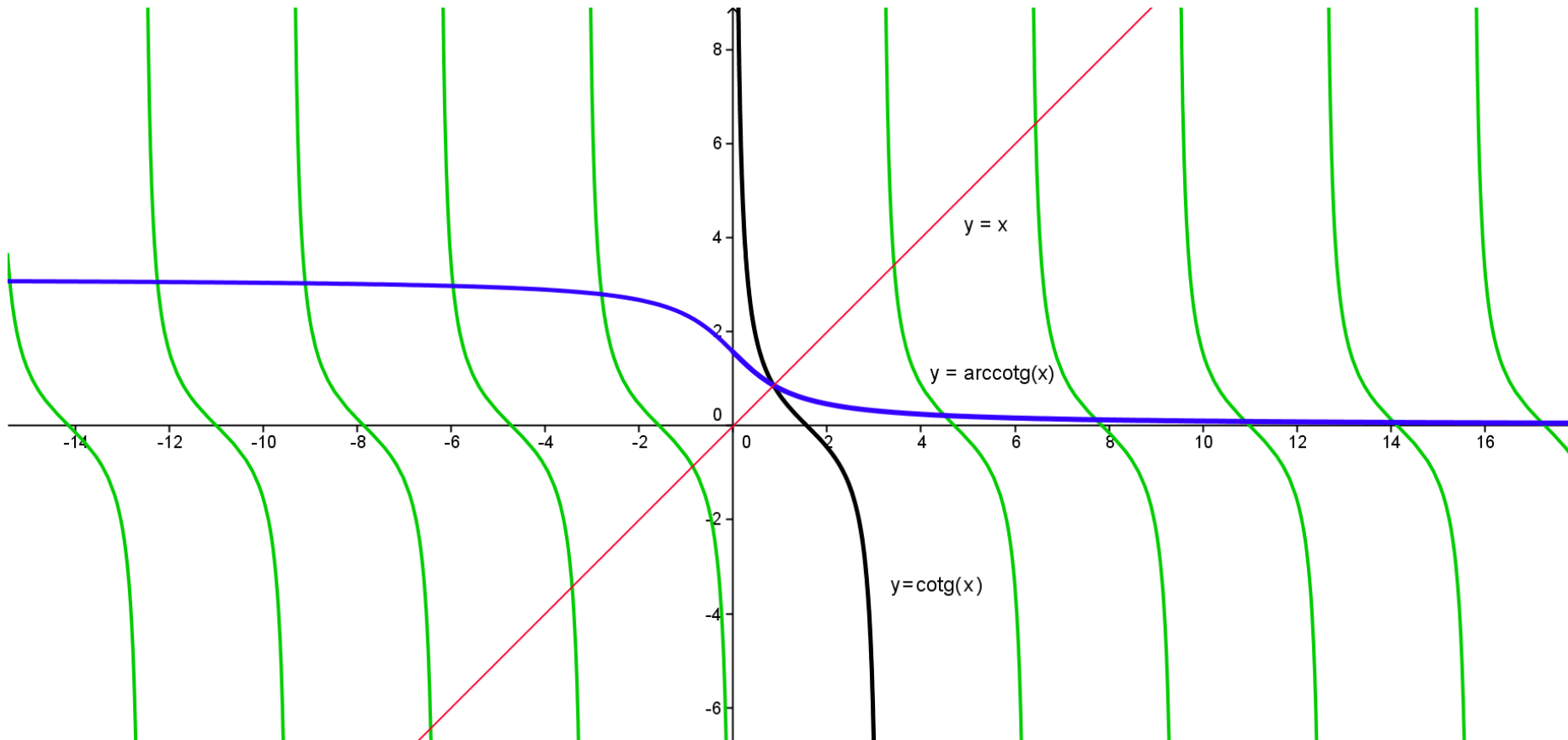
$$y = \cotg x, D(f) = (0, \pi)$$

arccotangent

$$y = \operatorname{arccotg} x$$

decreasing

$$D(f) = R, H(f) = (0, \pi)$$

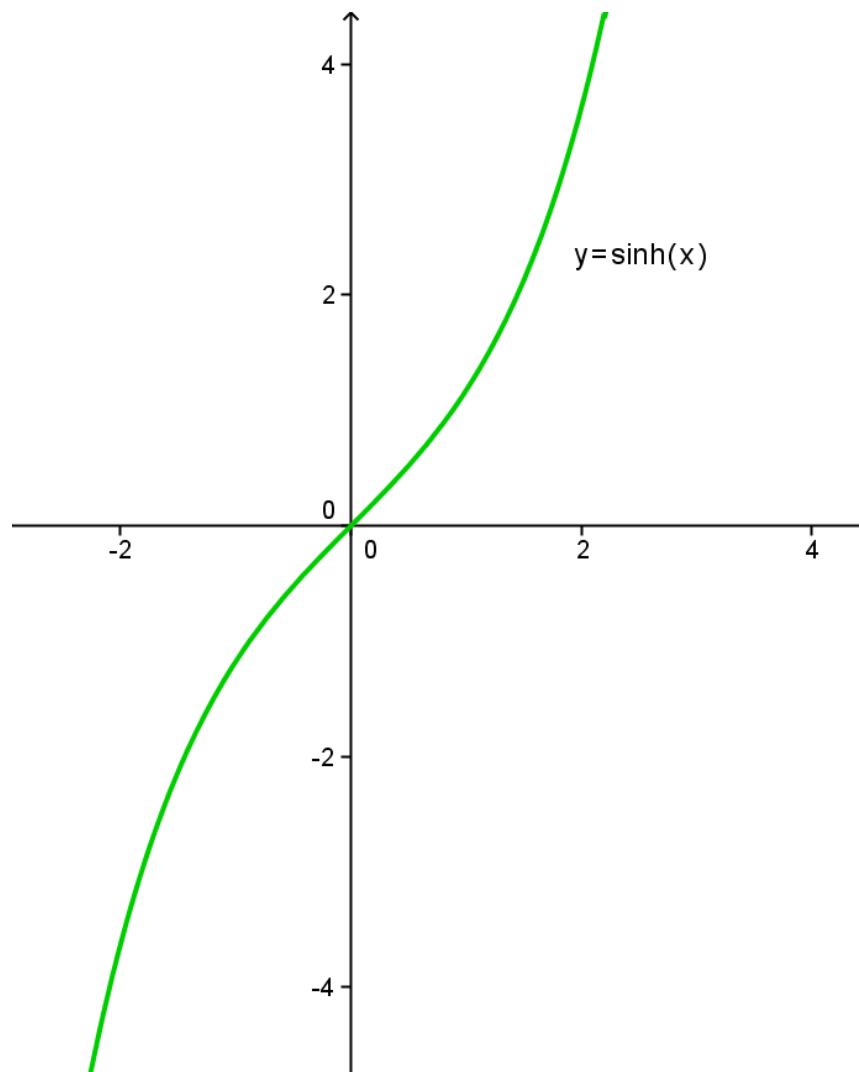


Hyperbolic function – sine hyperbolic

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

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

increasing, odd

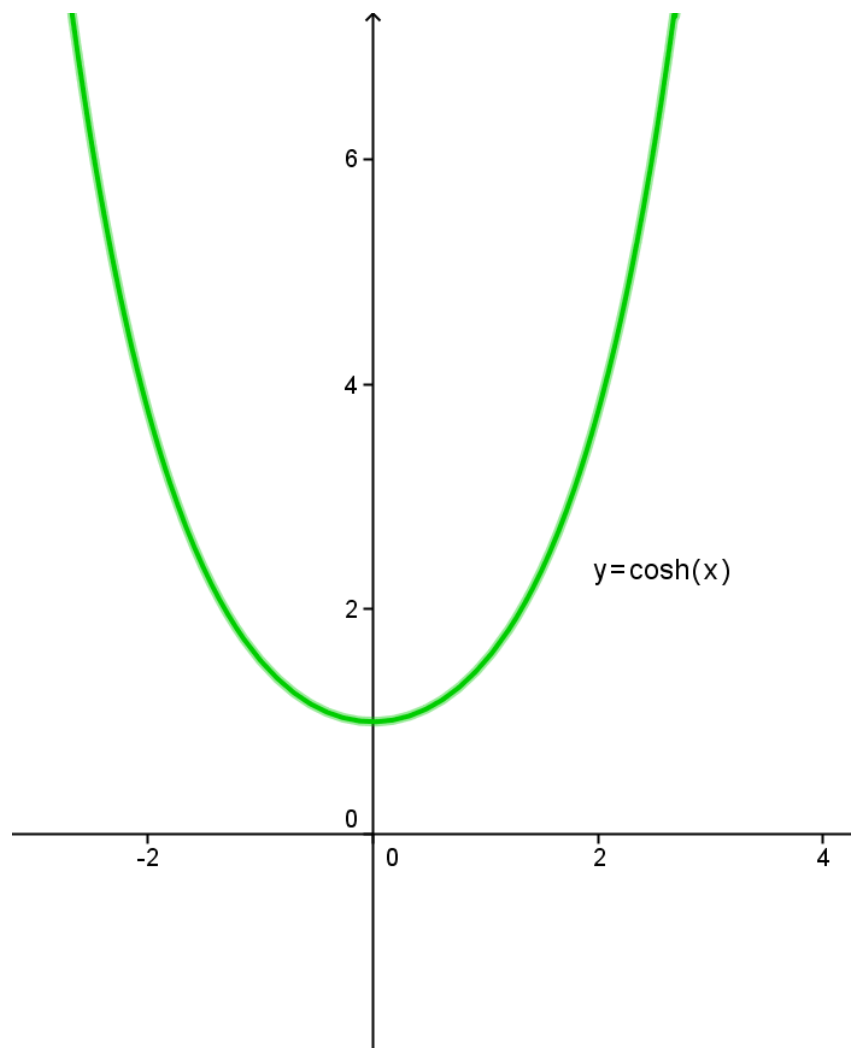


Hyperbolic function – cosine hyperbolic

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

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

even function

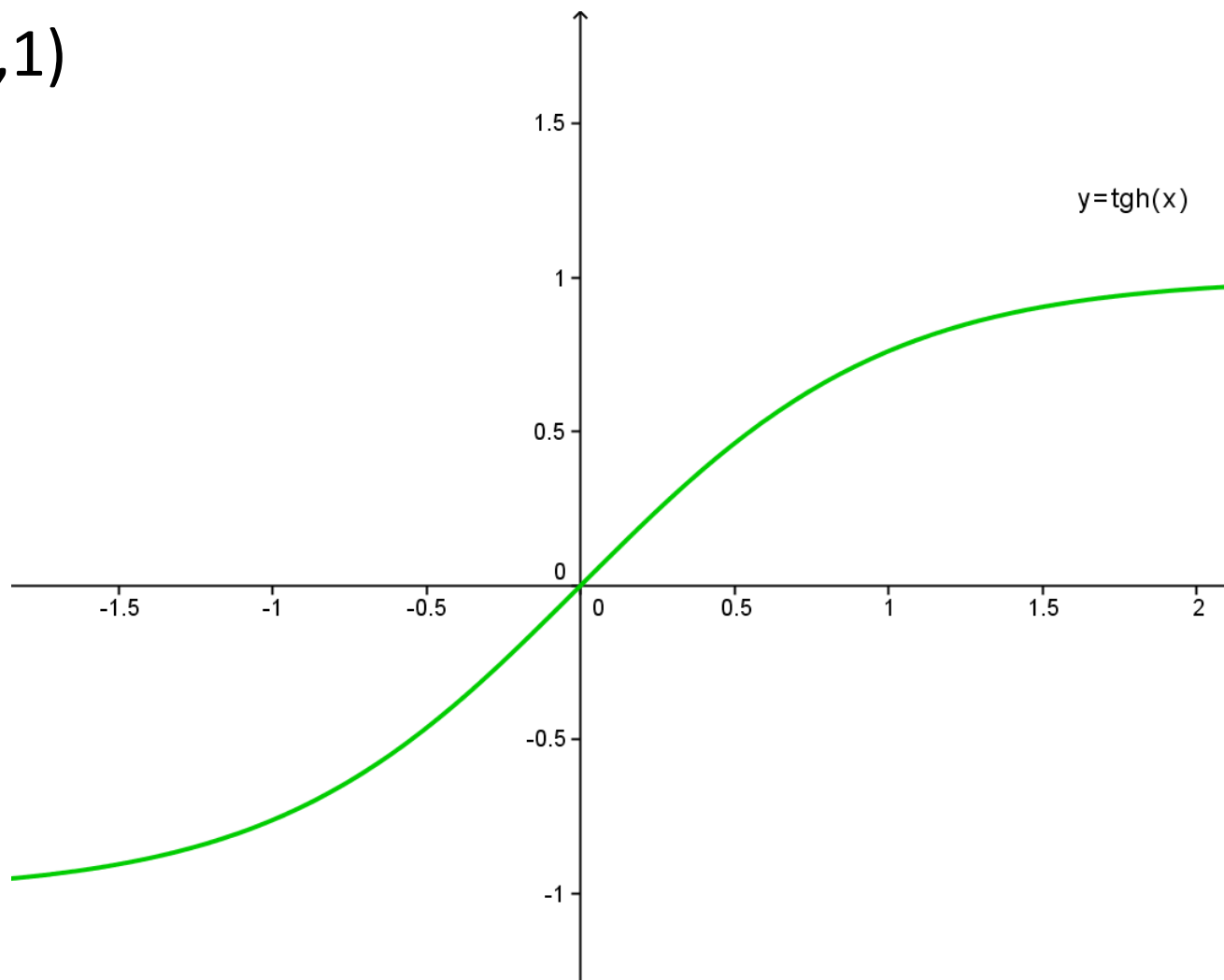


Hyperbolic function – tangent hyperbolic

$$\operatorname{tgh} x = \frac{\sinh x}{\cosh x} = \frac{e^x - e^{-x}}{e^x + e^{-x}}$$

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

increasing, odd



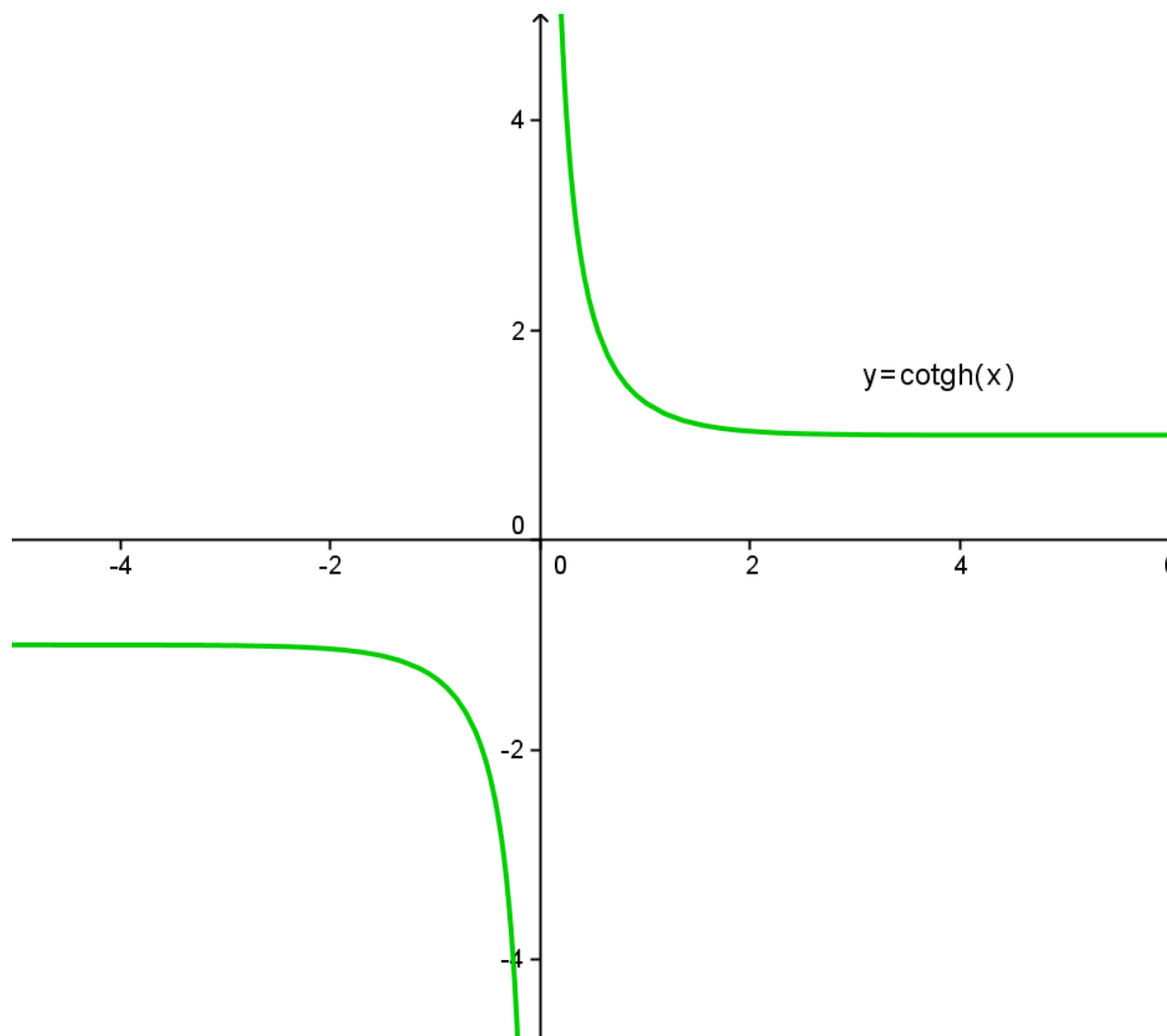
Hyperbolic function – cotangent hyperbolic

$$\operatorname{cotgh} x = \frac{\cosh x}{\sinh x} = \frac{e^x + e^{-x}}{e^x - e^{-x}}$$

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

$$H(f) = (-\infty, -1) \cup (1, \infty)$$

decreasing, odd

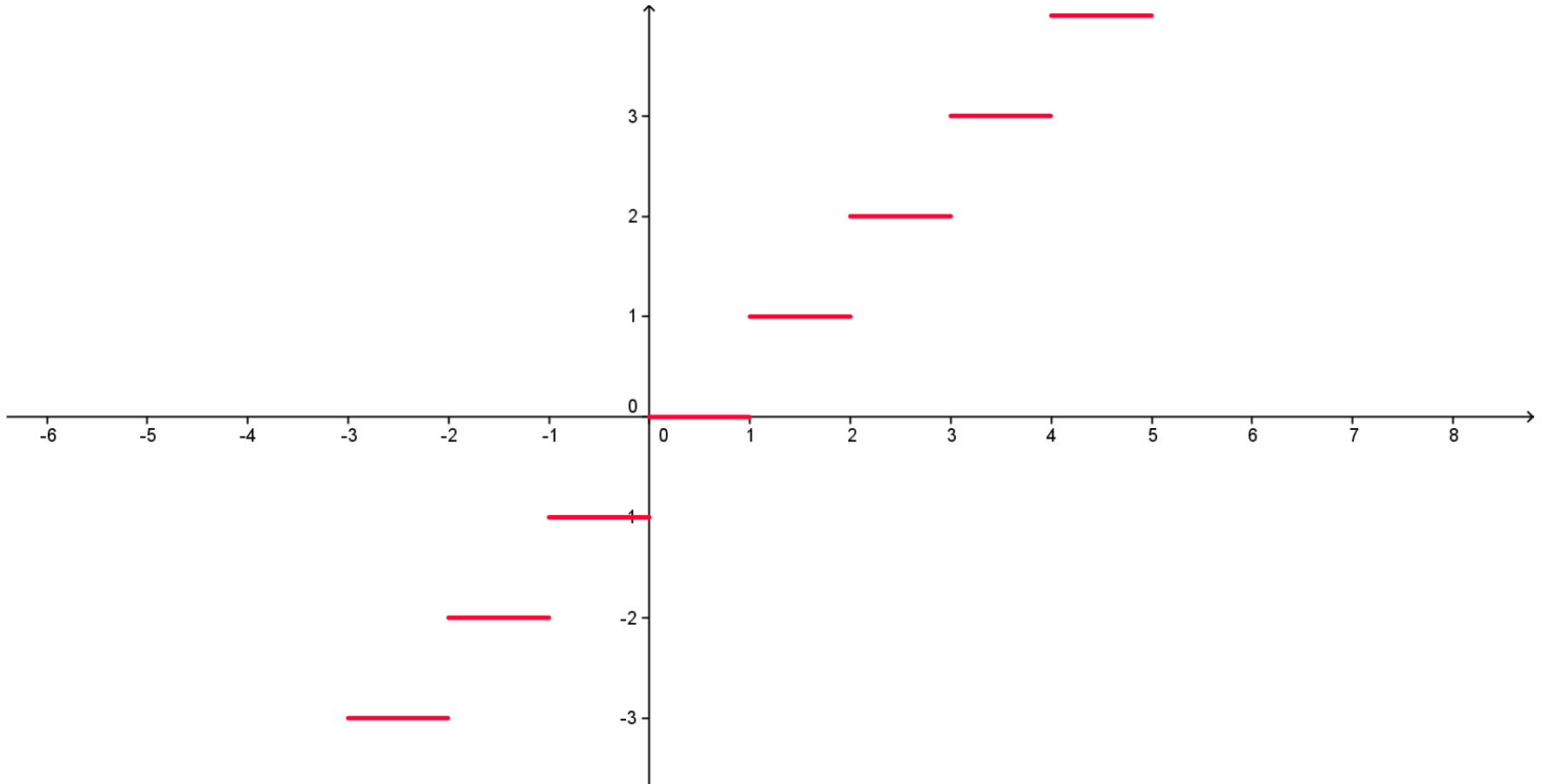


Function integer part (floor and ceiling)

$$f(x) = [x]$$

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

$$[x] \leq x < [x] + 1$$



Function signum

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

$$D(f) = \mathbb{R}, H(f) = \{-1, 0, 1\}$$

