1) $4 \ln e^3 - \dfrac{5}{e^{2\ln 0{,}5}} - \left(\dfrac{1}{2} e^{\ln 3^2} - \ln \dfrac{1}{\sqrt{e}} \right) + \dfrac{8}{\ln e^2} + e^{2\ln 3}$

$\ln (e^3)^4 \quad - \dfrac{5}{e^{\ln (1/2)^2}} - \left(\dfrac{1}{2} \cdot 3^2 - \ln e^{-1/2} \right) + \dfrac{8}{2} + e^{\ln 3^2}$

$\ln e^{12}$

$12 \quad - \dfrac{5}{1/4} - \left(\dfrac{9}{2} + \dfrac{1}{2} \right) + 4 + 9 = 0$

2) $3 \cdot 5 - 2 \cdot \left(e^{\ln 2^2} + \ln e^{-1/4} \right) + \dfrac{10}{e^{\ln 2}} + 1/2 \cdot 3$

$15 - 2 \cdot \left(4 - 1/4 \right) + 5 + 3/2 = 14$

3) $\frac{1}{6} \cdot 3 + 3 \cdot e^{\ln \frac{1}{4}} - \log 10^{\frac{1}{2}} + 4 \cdot \left(2^{\operatorname{ld}\left(\frac{1}{2}\right)^4} - 8 \cdot \ln e^{-\frac{1}{2}} \right) - 4 \cdot 10^{\log 256^{\frac{1}{4}}}$

$\cancel{\frac{1}{2} + \frac{3}{4} - \frac{1}{2} + 4 \cdot}$

$\frac{1}{2} + \frac{3}{4} - \frac{1}{2} + 4 \cdot \left(\frac{1}{16} + 4 \right) - 4 \cdot 4 = 1$

4) $\frac{2}{3} \cdot \left(\log 10^3 - \frac{1}{2} \right) - \frac{2}{0{,}5} + 2^3 \cdot 2^{\operatorname{ld} 3} - 10^{\log 3^2} + \ln e^{-\frac{2}{3}} - 4 \cdot \operatorname{ld} 2^{\frac{1}{2}}$

$\frac{2}{3} \cdot \left(3 - \frac{1}{2} \right) - 4 + 8 \cdot 3 - 9 - \frac{2}{3} - 2 = 10$

Exponentialfunktion

2^x $\quad 2^{\infty} \to \infty$

$2^{-\infty} \to 0$

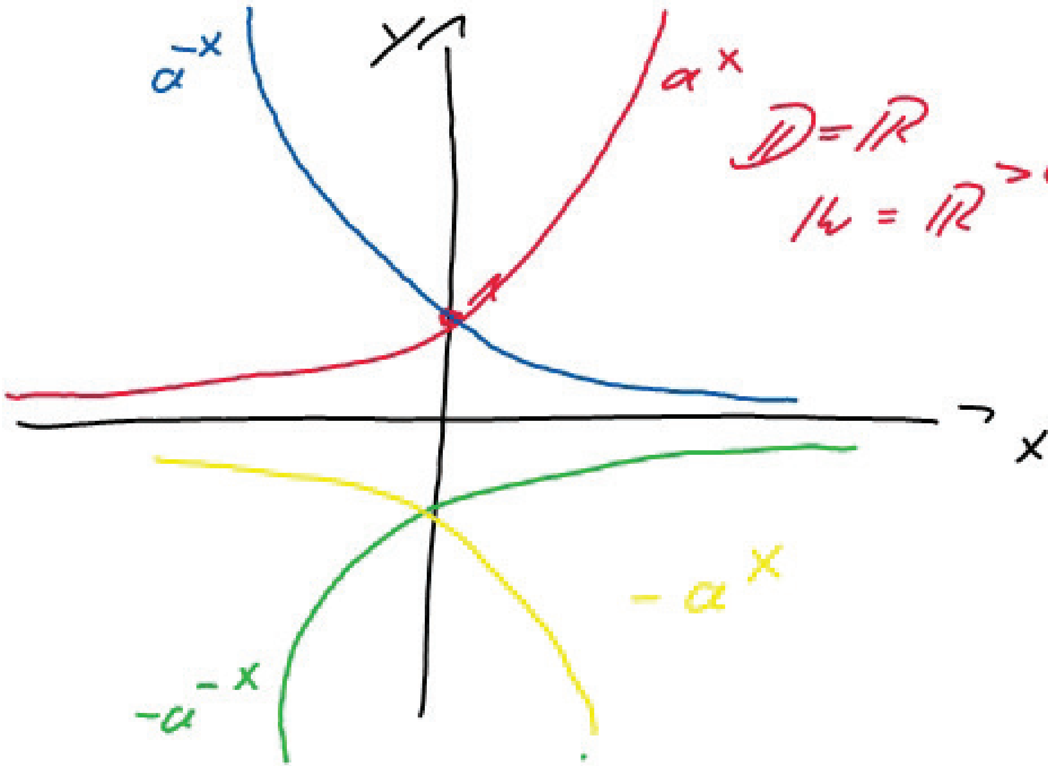
$\frac{1}{2^{\infty}}$

$2^{0} \to 1$

$f(x) = a^x \,;\, a \in \mathbb{N}^{>1}$

$\mathbb{D} = \mathbb{R}$

$\mathbb{W} = \mathbb{R}^{>0}$



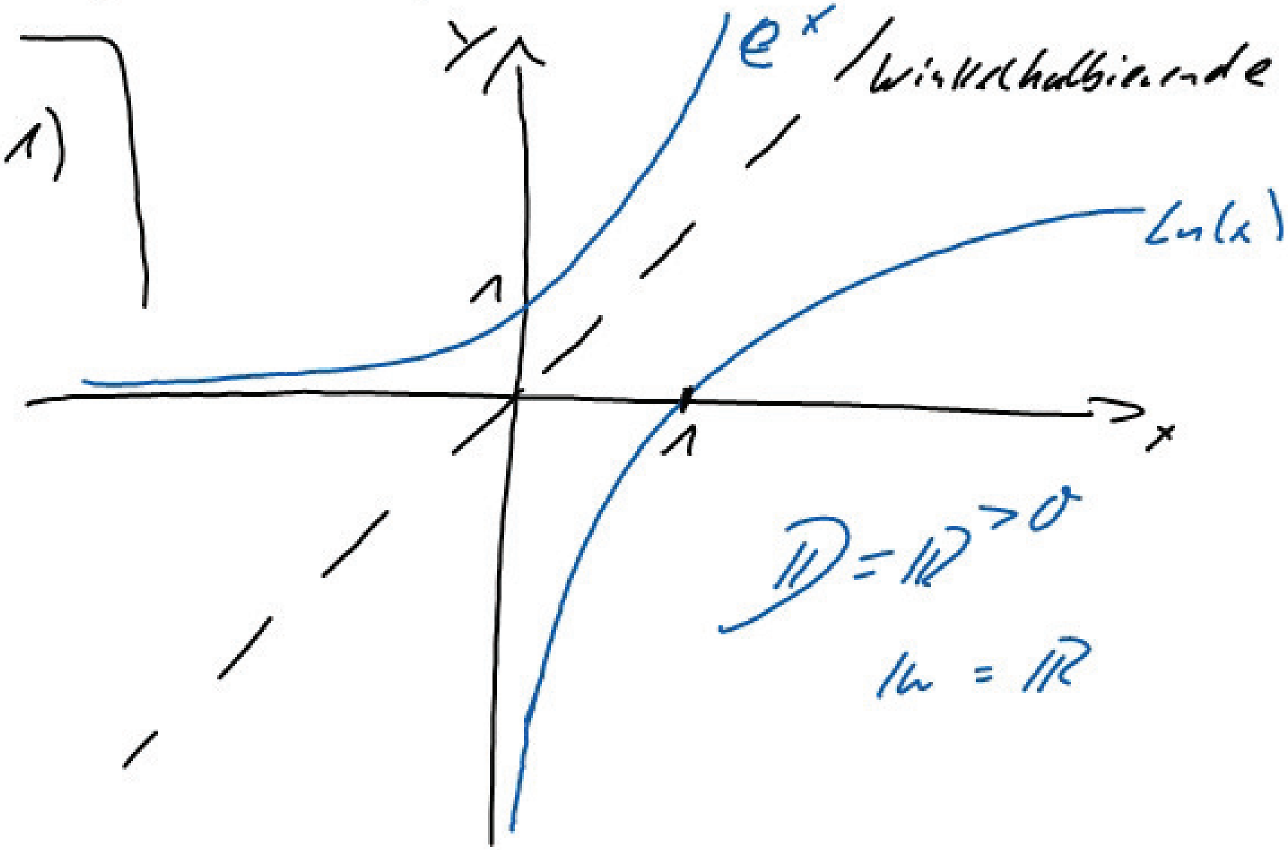
Logarithmusfunktion $f(x) = \ln(x)$

$x = \log(-1)$

$10^x = (-1)$

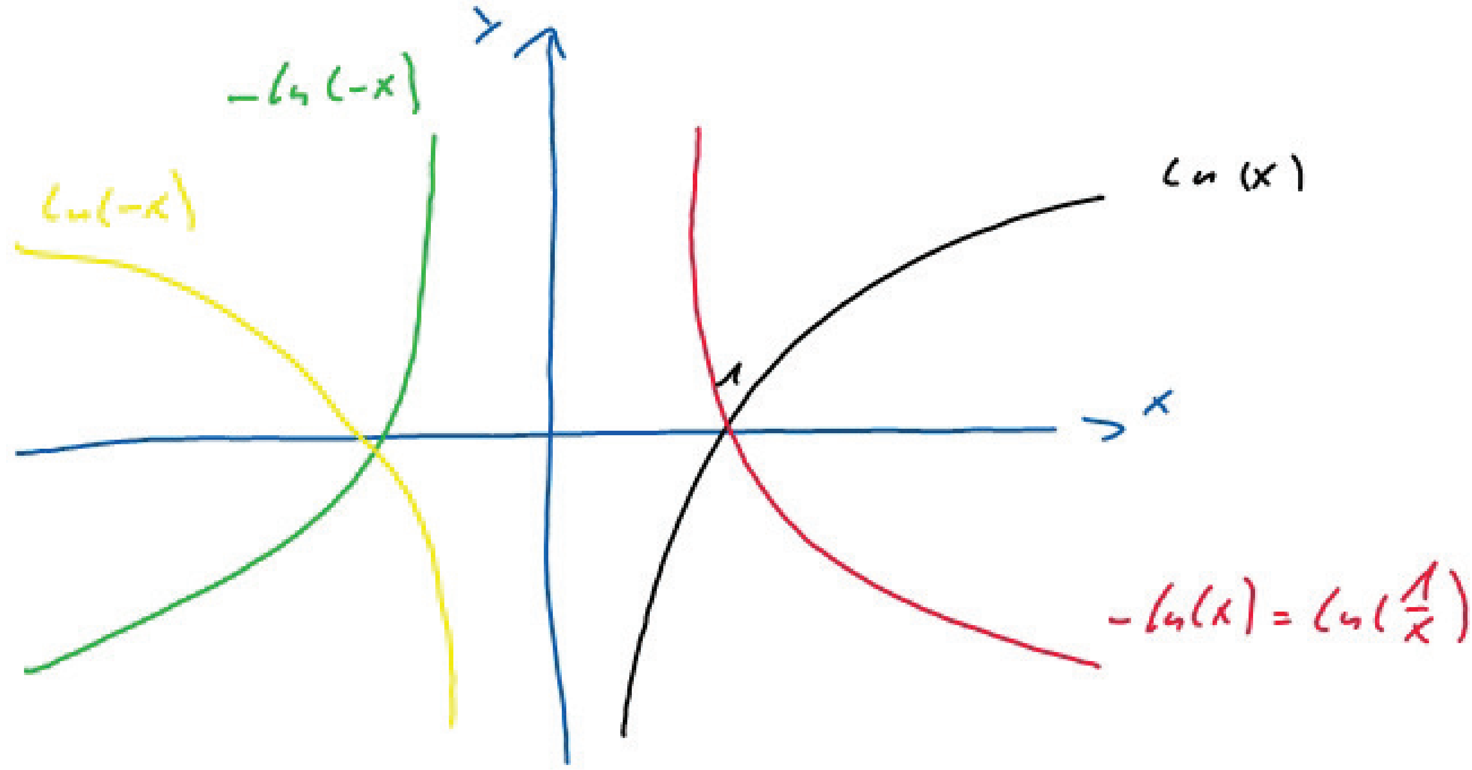
$x = \ln(0)$

$e^x = 0$



$\mathbb{D} = \mathbb{R}^{>0}$

$\mathbb{W} = \mathbb{R}$


y
x
-ln(-x)
ln(-x)
ln(x)
1
-ln(x) = ln(1/x)

$$3\cdot\log x - 4\cdot\log\left(\frac{2}{x}\right) - \frac{1}{3}\log\left(x^2\right)^6 = \frac{2}{3}\log 27 + \frac{1}{2}\log x^4 - 2\log 6$$

$$\log x^3 - \log\frac{16}{x^4} - \log x^4 = \log 3^2 + \log x^2 - \log 36$$

$$\log\frac{x^3\ \cancel{x^4}}{16\ \cancel{x^4}} = \log\frac{\overset{1}{\cancel{9}}\ x^2}{\underset{4}{\cancel{36}}} \qquad |\uparrow 10^x$$

$$\frac{16}{x^4}$$

$$\frac{x^3}{16} = \frac{x^2}{4} \qquad |\cdot\frac{1}{x^2}\cdot 16$$

$$x = 4 \qquad \mathbb{L} = \{4\}$$

2) $3 \cdot \ln 4 - \frac{1}{4} \ln \frac{16}{x^4} + 2 \ln 8 = \frac{3}{2} \ln x^4 - 8 \ln x^{-1/4} - 2 \ln 1/4$

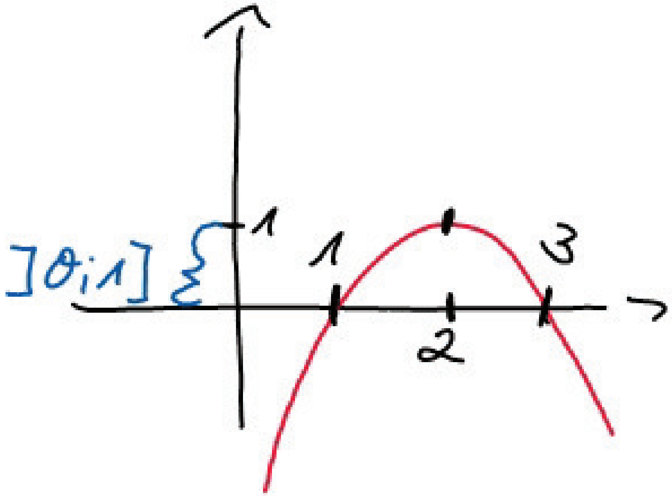
$\ln 4^3 - \ln \frac{4}{x^2} + \ln 64 = \ln x^6 - \ln x^{-2} - \ln 1/16$

$\ln \frac{4^3 x^2 \; 64}{4} = \ln \frac{x^6 \; 16}{x^{-2}} \quad | \; e^x$

$\frac{4^3 x^2 \; 64}{4} = x^6 x^2 \; 16 \quad | \; 1/16 \; \cdot \; 1/x^2$

$4^3 = x^6 \qquad x = 2$

$$f(x) = \tfrac{2}{5} \cdot \ln(\underbrace{4x - 3 - x^2}_{>0})$$



$$-x^2 + 4x - 3 = 0 \quad /$$
$$-(x^2 - 4x + 3) = 0$$
$$-(x-1)(x-3) = 0$$

$$\mathbb{D} = x > 1 \wedge x < 3$$
$$= x \in]1;3[_{\mathbb{R}}$$

$$\mathbb{W}: \lim_{x \to 1} f(x) = \tfrac{2}{5} \cdot \ln(\sim 0) = -\infty$$

$$\lim_{x \to 2} f(x) = \tfrac{2}{5} \cdot \ln(\sim 1) = 0$$

$$\hookrightarrow \quad \mathbb{W} = y \in \mathbb{R}^{\leq 0}$$