Def. 36: $\exp: \mathbb{R} \to \mathbb{R}$,

$$\exp(x) := \sum_{k=0}^{\infty} \frac{x^k}{k!}$$

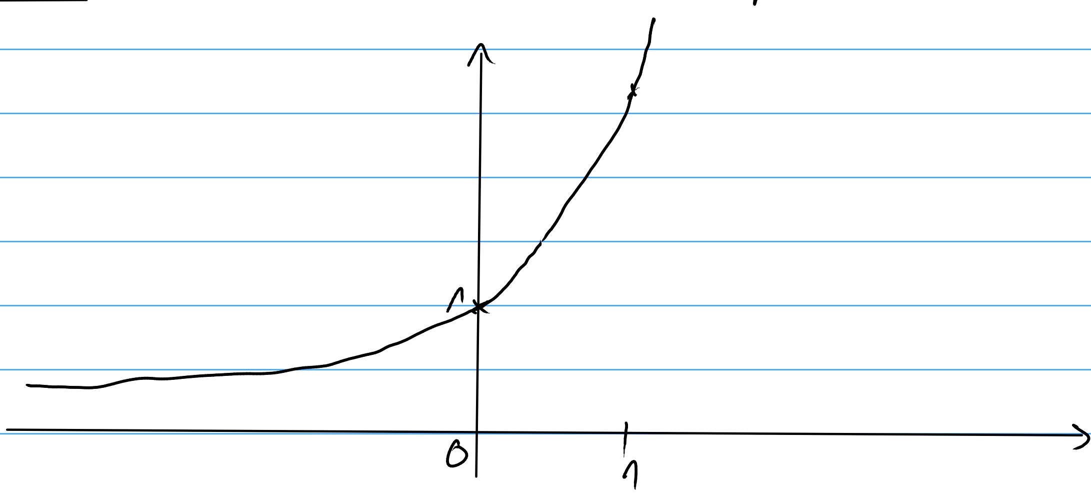
$e := \exp(1)$, $\exp(0) := 1$

$$\exp(x+y) = \exp(x) \cdot \exp(y) \quad \text{"Funktionalglg."}$$

$\rightsquigarrow \forall x \in \mathbb{R}, y \in \mathbb{Q}: \exp(xy) = \exp(x)^y$

$\rightsquigarrow \exp(y) = \exp(1 \cdot y) = \exp(1)^y = e^y$

Def. 37: Für $x \in \mathbb{R} \setminus \mathbb{Q}$ def. $e^x := \exp(x)$.



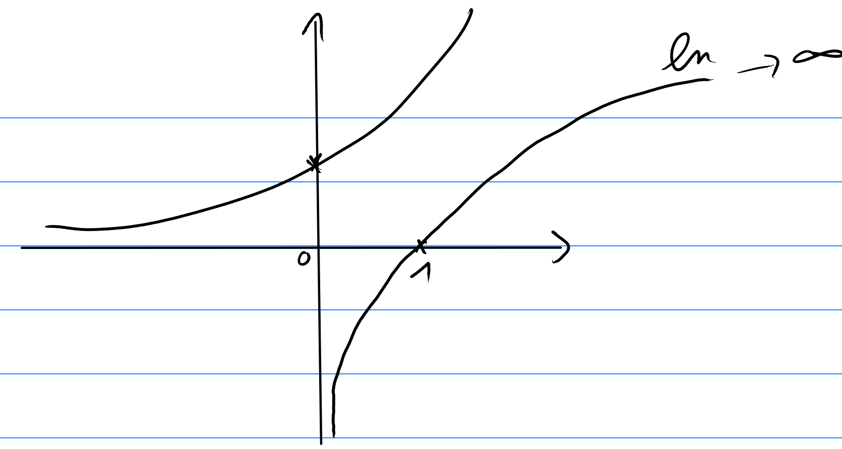
Löse Glg. nach x auf:

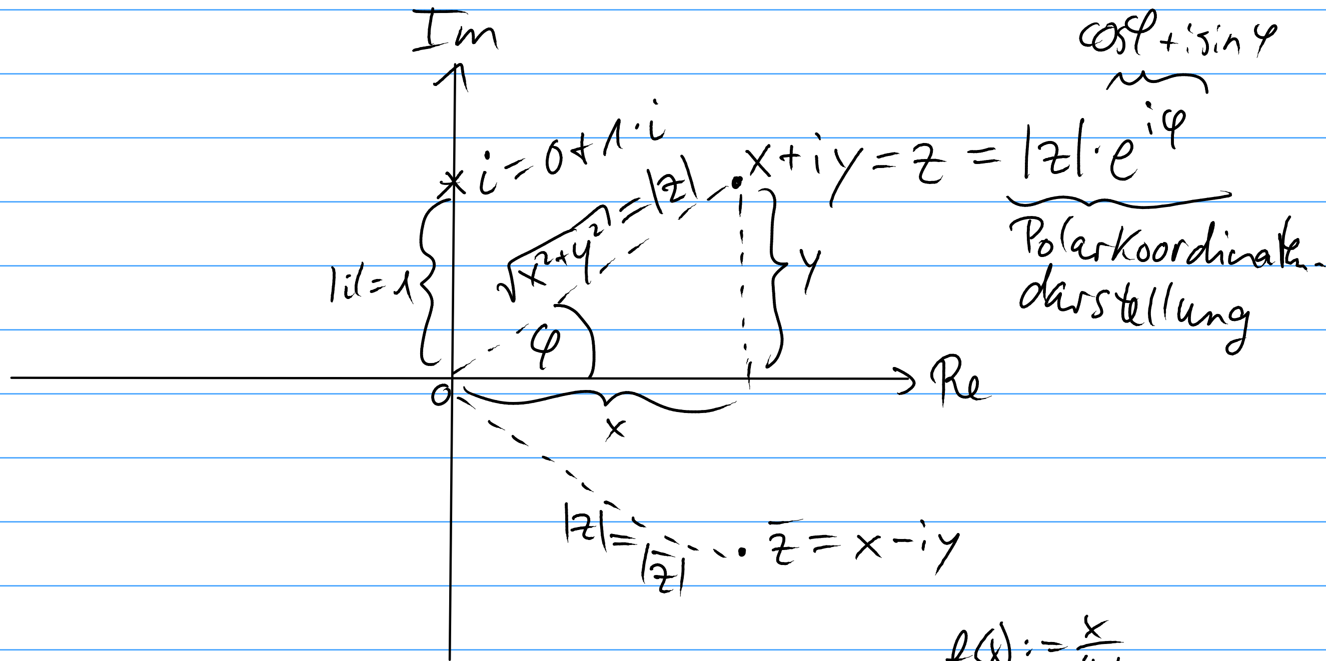
$a^x = c$, geg. $a, c \in \mathbb{R}_{>0}$, $a \neq 1$

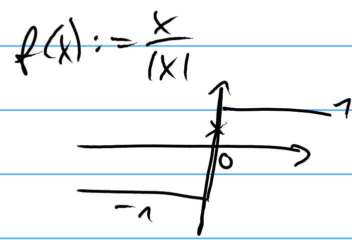
$\Leftrightarrow \ln a^x = \ln c \Leftrightarrow x \ln a = \ln c \Leftrightarrow x = \frac{\ln c}{\ln a}$

Löse Glg. nach a auf: $a^x = c \Leftrightarrow a = c^{1/x} = e^{(1/x)\ln c}$

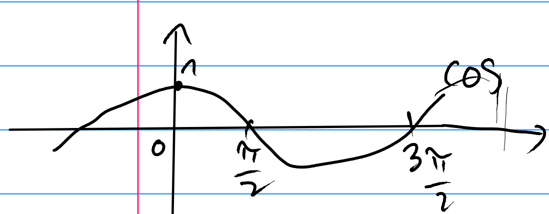
$= e^{(\ln c)/x}$

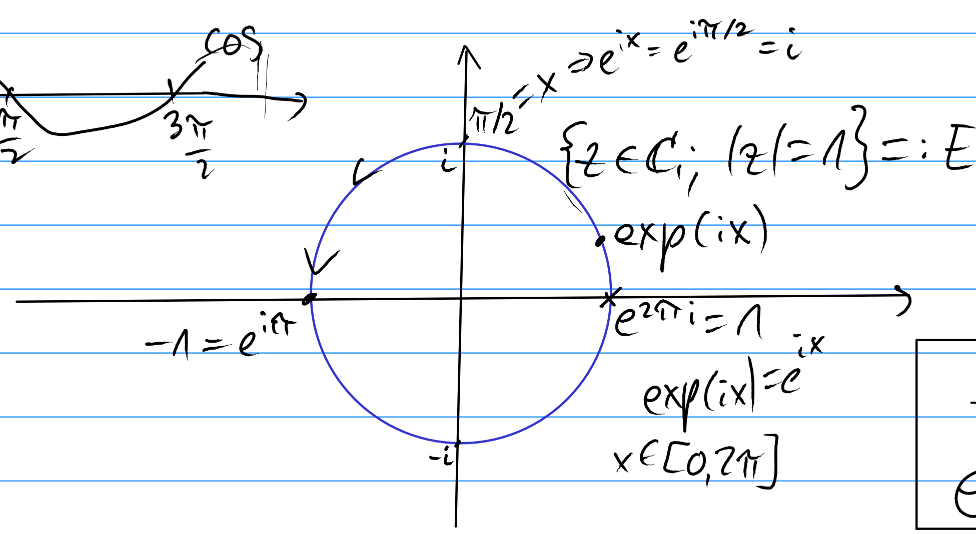






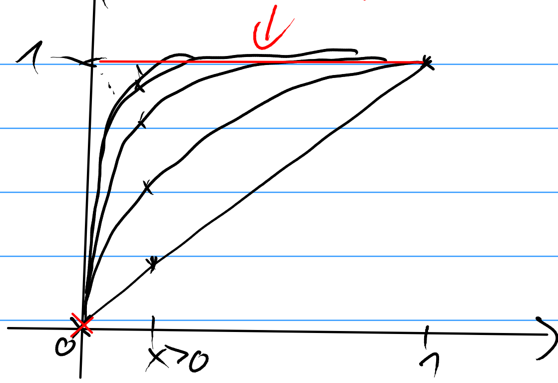
$P(z) = z^2 + 1$ hat Nst. $i, -i$





$$\boxed{\begin{array}{c}\underline{\text{Eulersche Formel:}}\\ e^{2\pi i} = 1\end{array}}$$

Grenzfunktion unstetig bei $x = 0$



$x^{1/n} = f_n(x)$, $f_n : [0,1] \to \mathbb{R}$

alle f_n stetig!

Grenzfkt.: $f : [0,1] \to \mathbb{R}$,
$$f(x) = \begin{cases} 0, & x = 0 \\ 1, & x > 0 \end{cases}$$