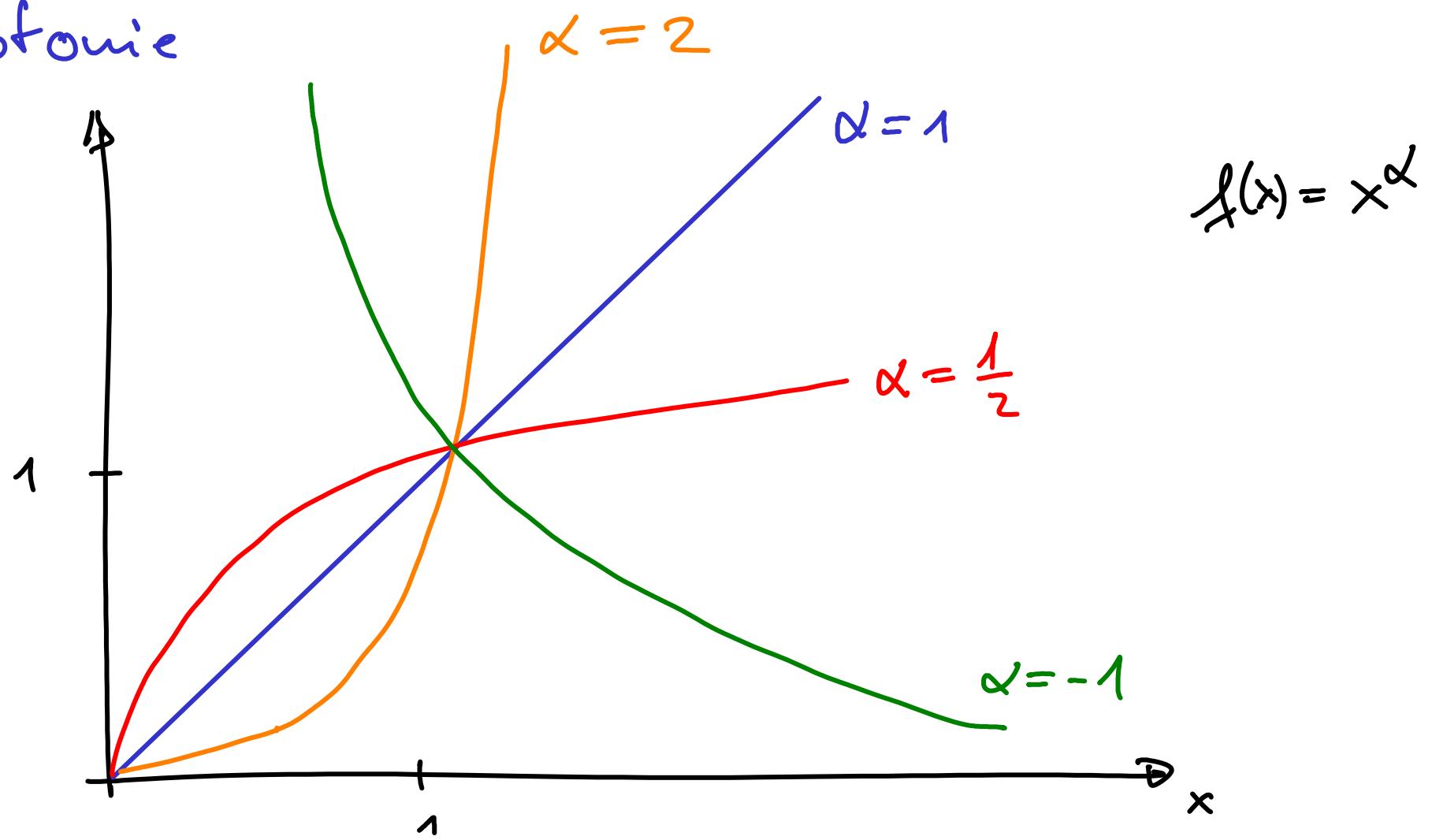


$$\sqrt[3]{9^{-2} \cdot 3} = [(3^2)^{-2} \cdot 3]^{\frac{1}{3}}$$

$$= (3^{-4} \cdot 3)^{\frac{1}{3}} = (3^{-3})^{\frac{1}{3}} = 3^{-1} = \frac{1}{3}$$

Monotonie



$$t = \frac{1}{2} \quad (\text{halbes Jahr})$$

$$\alpha = 1,06 \quad (6\% \text{ Zinzen})$$

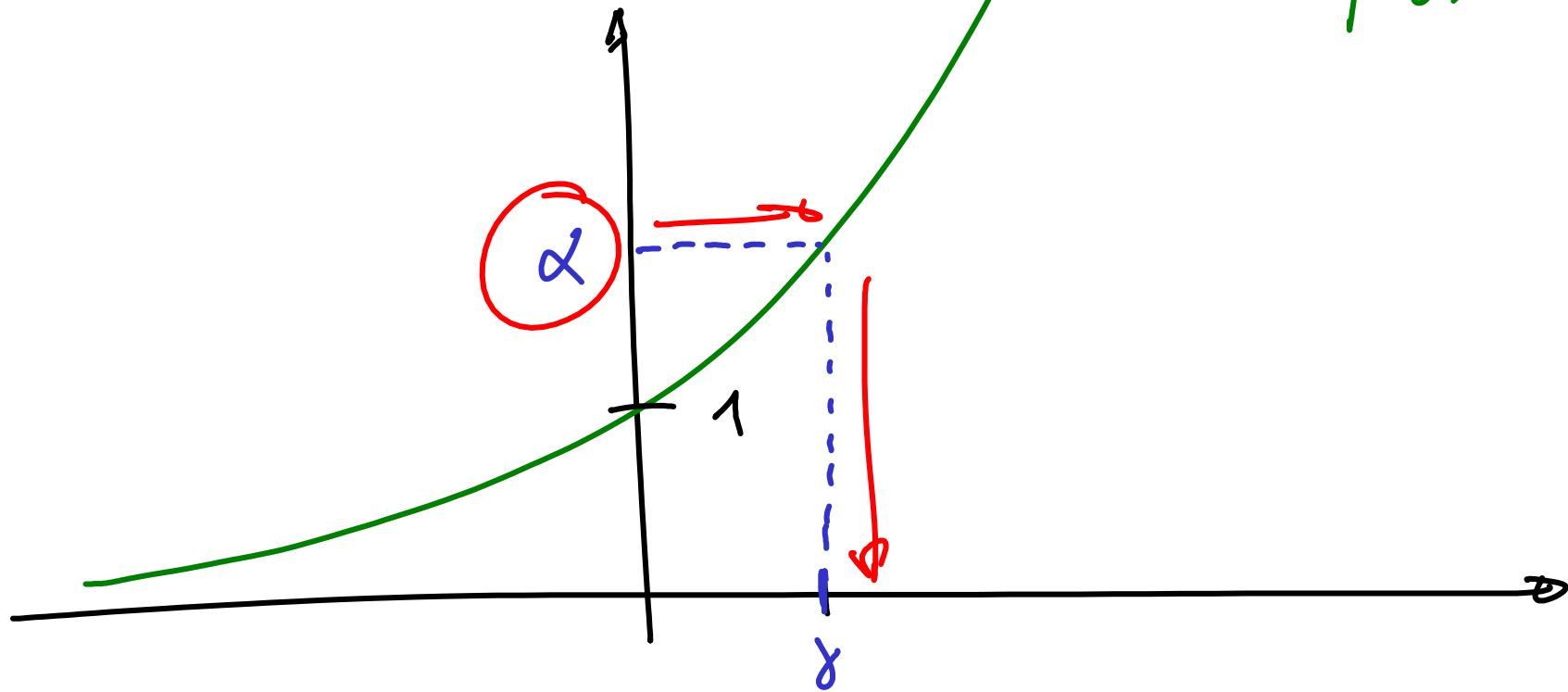
$$G(0) = 100 \text{ €}$$

Rückzahlung nach halbe Jahr

$$G\left(\frac{1}{2}\right) = (1,06)^{1/2} \cdot 100 \text{ €} \approx 102,96 \text{ €}$$

$$\underline{\alpha}^t = e^{\gamma t} = (\underline{e^\gamma})^t$$

$$e^\gamma = \exp(\gamma)$$



$$(\gamma \in \mathbb{R}, \alpha > 0)$$

$$\alpha^{t/\tau} = (e^\gamma)^{t/\tau} = e^{\frac{\gamma t}{\tau}}$$

$$\alpha = e^\gamma$$

$$= e^{\gamma t}$$

$$\frac{\gamma}{\tau} = \lambda$$

$$G(t) = e^{\lambda t} G(0)$$

$$G\left(\frac{1}{\lambda}\right) = e^{\lambda \frac{1}{\lambda}} G(0) = e \cdot G(0)$$

$$G\left(-\frac{1}{\lambda}\right) = e^{\lambda \cdot \left(-\frac{1}{\lambda}\right)} G(0) = e^{-1} \cdot G(0) = \frac{G(0)}{e}$$

radioaktiver Zerfall

$G(t)$ Fliege zu Beginn des Intervalls $[t, t+T]$ vorhanden ist

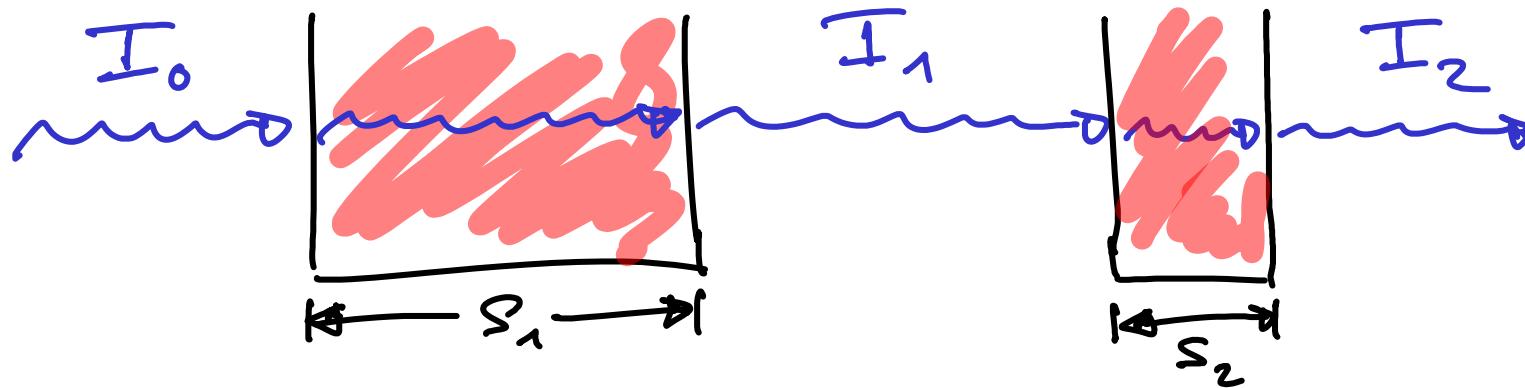
$G(t+T)$ Fliege am Ende des Intervalls

Verhältnis

$$\frac{G(t+T)}{G(t)} = \frac{e^{-\lambda(t+T)} G(0)}{e^{-\lambda t} G(0)} = e^{-\lambda T}$$

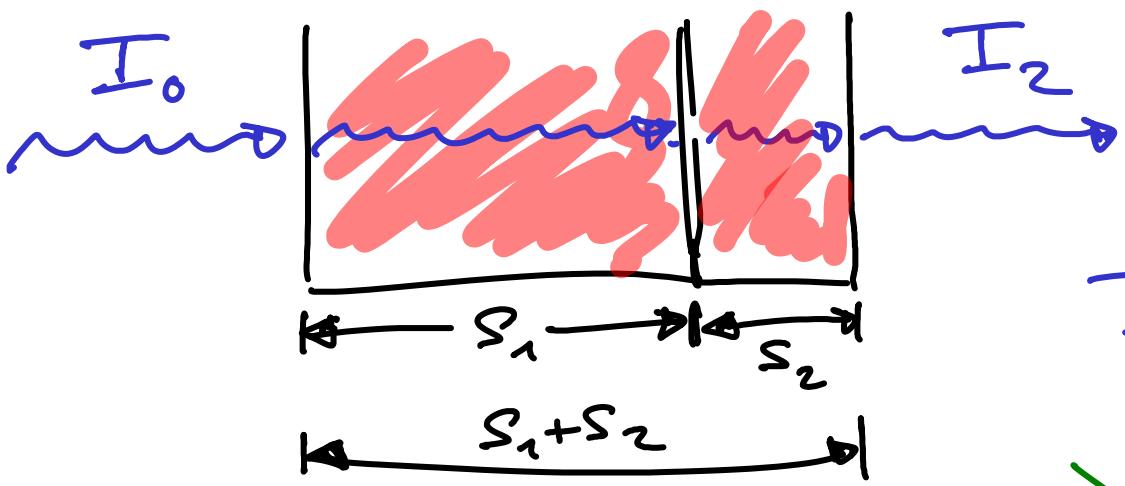
hängt nicht von t ab!

zum Lambert-Beer-Gesetz



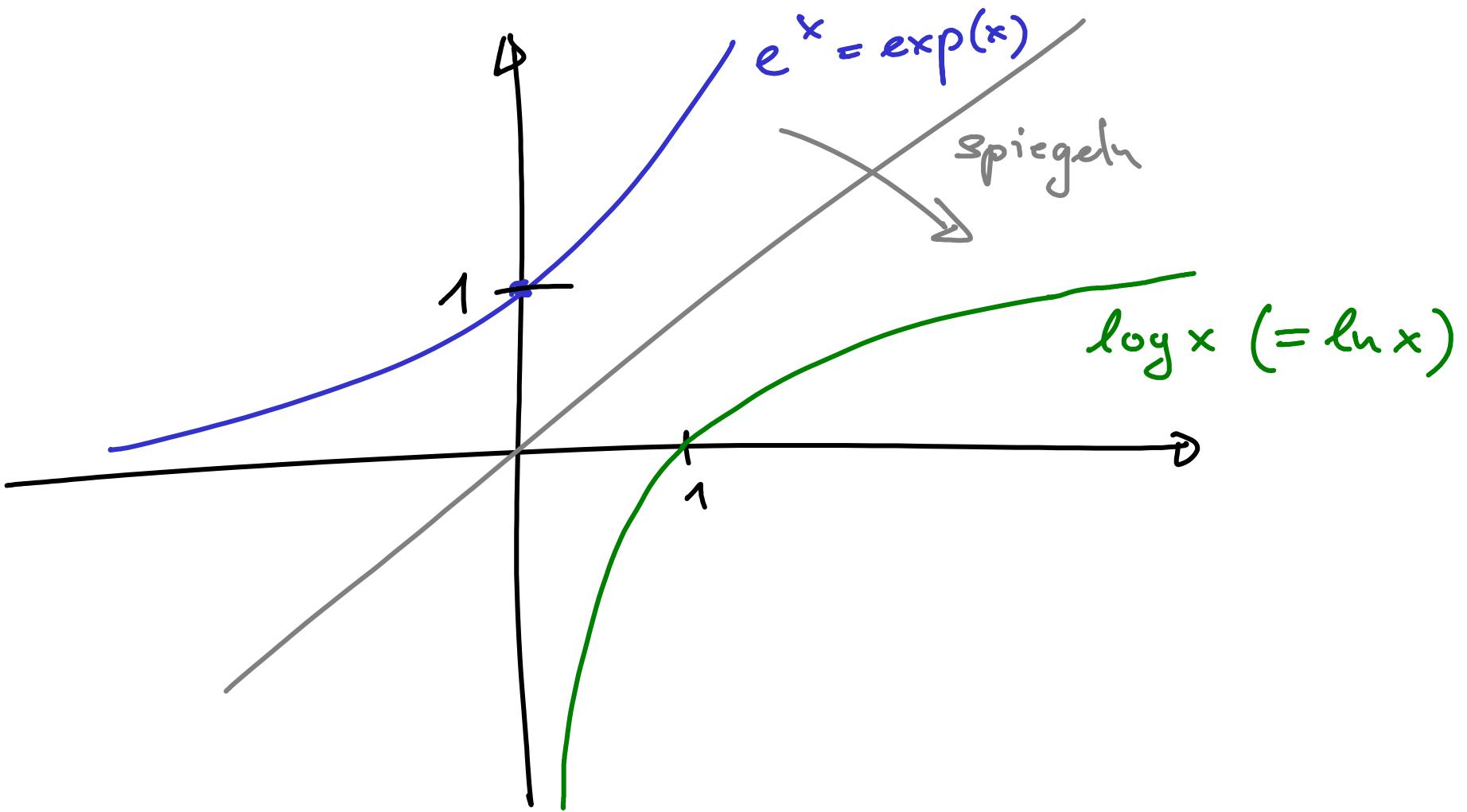
$$\underline{I_1 = \alpha_{S_1} \cdot I_0}, \quad I_2 = \alpha_{S_2} \cdot I_1 = \alpha_{S_2} \cdot \alpha_{S_1} \cdot I_0$$

A green curved arrow points from the first equation to the second, indicating that the absorbance of the first layer is multiplied by the absorbance of the second layer to find the total absorbance.



$$I_2 = \alpha_{S_1+s_2} I_0$$

$\Rightarrow \alpha_{S_1+s_2} = \alpha_{S_2} \cdot \alpha_{S_1}$



log - Rechenregeln

$$\textcircled{1} \quad \log(xy) = \log x + \log y$$

$$x = e^a, \quad y = e^b \quad (\Leftrightarrow) \quad \log x = a, \quad \log y = b$$

$$\log(xy) = \log(e^a \cdot e^b) \stackrel{\text{Potenzrechnung}}{=} \log(e^{a+b})$$

$$= a + b = \log x + \log y$$

↑
log und $e^{...}$
sind umkehrfkt.

$$\textcircled{2} \quad \log(x^\alpha) = \alpha \log x \quad (x > 0, \alpha \in \mathbb{R})$$

$$x = e^\gamma \iff \log x = \gamma$$

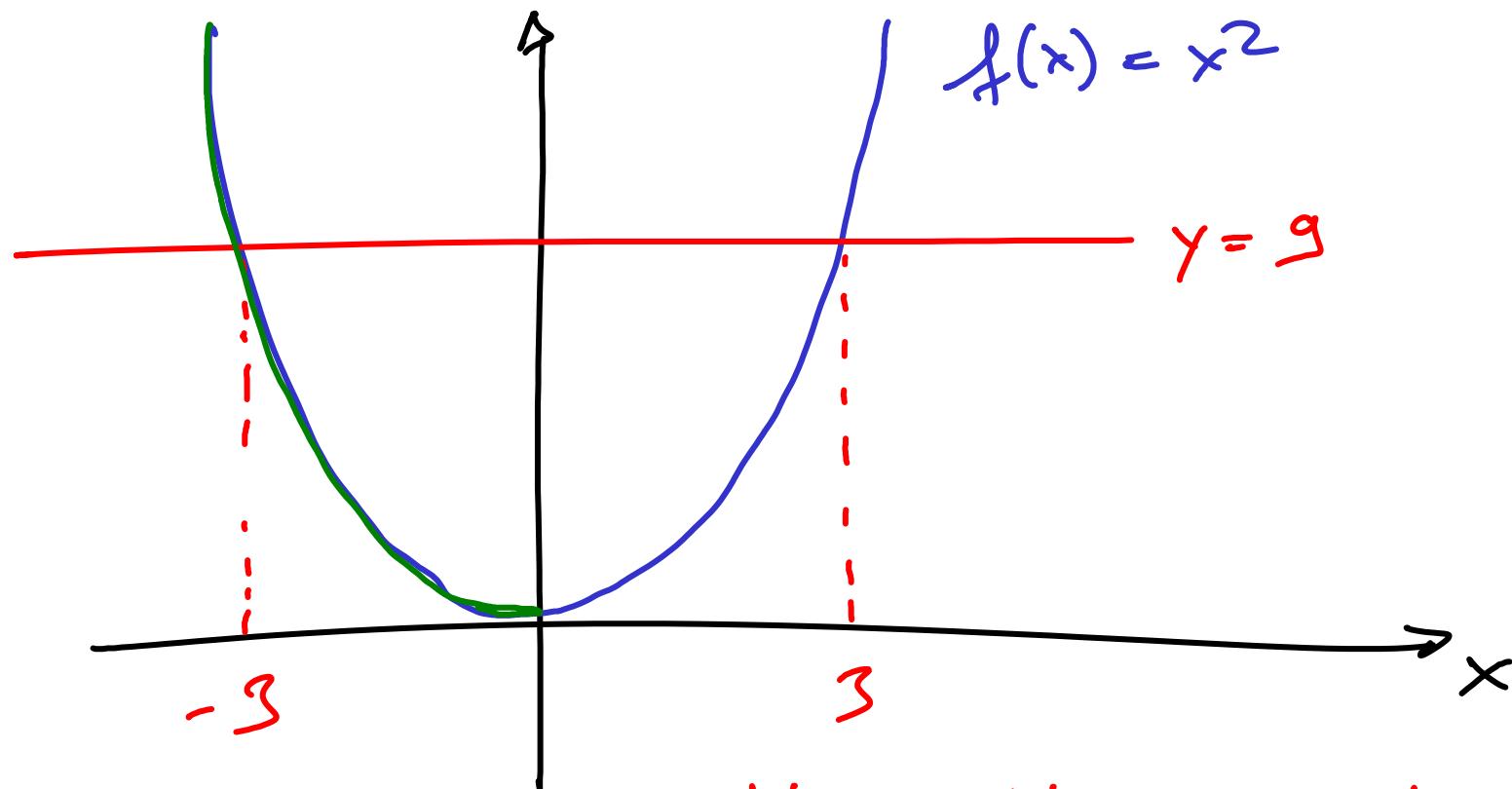
$$\begin{aligned} \log(x^\alpha) &= \log((e^\gamma)^\alpha) \stackrel{\text{P.R.}}{=} \log(e^{\gamma \cdot \alpha}) \\ &= \gamma \cdot \alpha = \alpha \cdot \log x \end{aligned}$$

$\log \Leftrightarrow \exp$
Umkehrfkt.

$$\textcircled{3} \quad \log\left(\frac{1}{x}\right) = -\log x \quad (\textcircled{2} \text{ für } \alpha = -1)$$

$$\textcircled{4} \quad \log(1) = \log(e^0) = 0$$

Umkehrfunktionen



nicht injektiv \Rightarrow nicht umkehrbar

$$f: [0, \infty) \rightarrow [0, \infty) \quad \left. \begin{array}{c} x \mapsto x^2 \\ \end{array} \right\} \text{ist umkehrbar!}$$

$$f^{-1}: y \mapsto \sqrt{y}$$

ebenso

$$\tilde{f} : (-\infty, 0] \rightarrow [0, \infty) \quad \begin{matrix} x \\ \mapsto \\ x^2 \end{matrix} \quad \text{(linke Teil des Graphen)}$$

$$\tilde{f}^{-1} : [0, \infty) \rightarrow (-\infty, 0] \quad \begin{matrix} y \\ \mapsto \\ -\sqrt{y} \end{matrix}$$

f streng monoton wachsend / fallend

$$x \neq y$$

entweder

$$(i) \quad x > y \Rightarrow f(x) \geq f(y)$$

oder

$$(ii) \quad x < y \Rightarrow f(x) \leq f(y)$$

$$\left. \begin{array}{l} \\ \end{array} \right\} \Rightarrow f(x) \neq f(y)$$

injektiv