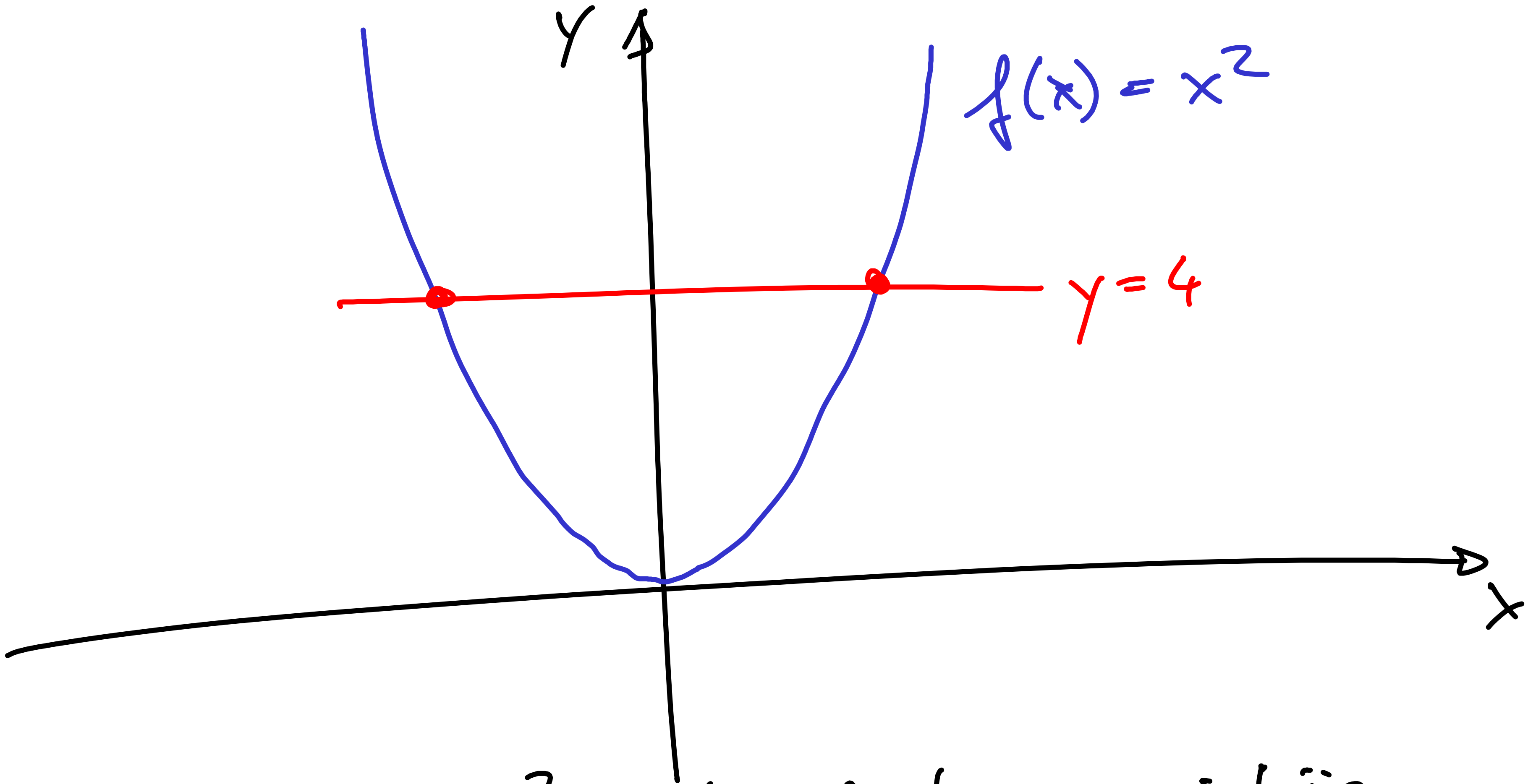
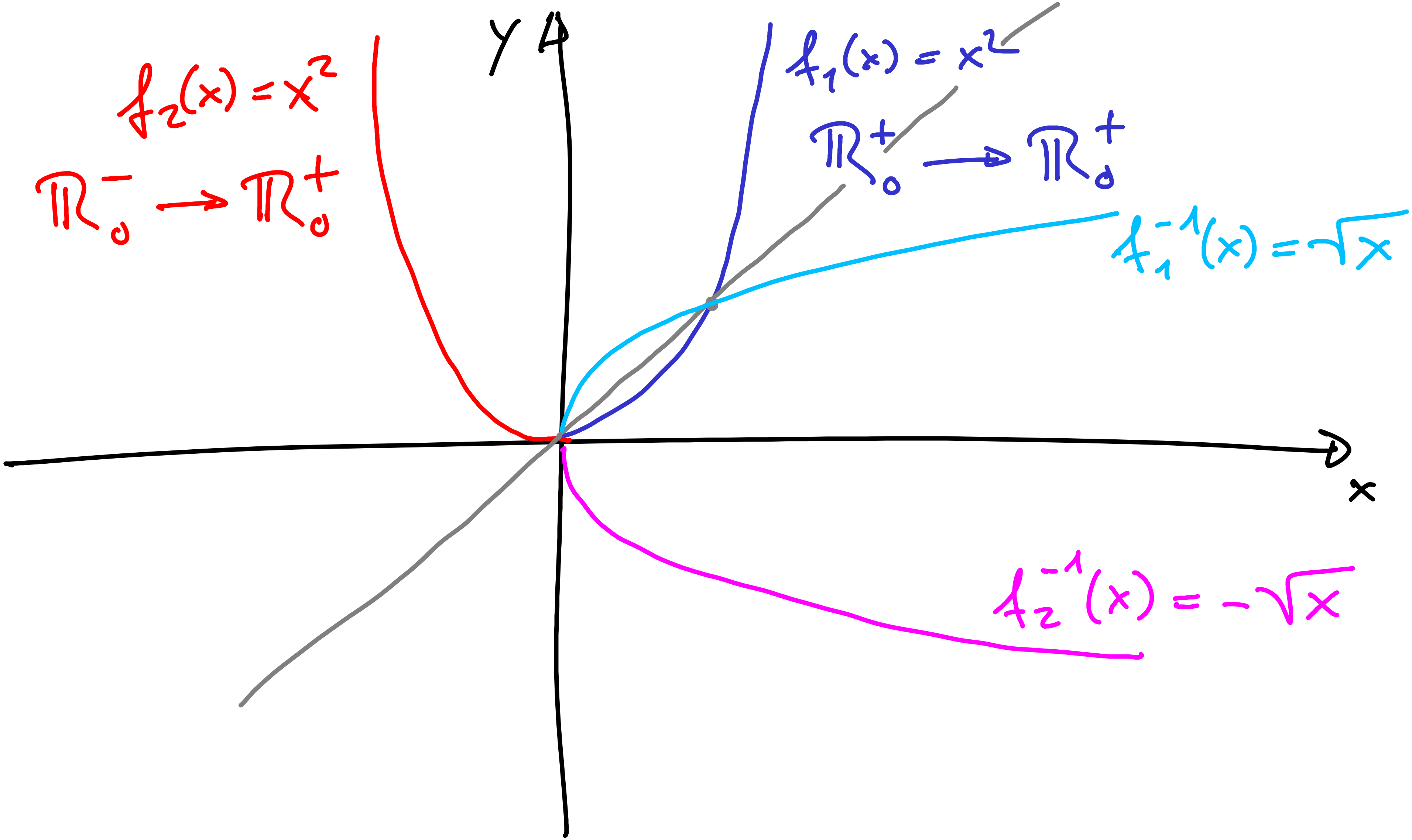


$f(x) = 4 \iff x^2 = 4$ hat zwei Lösungen

nämlich $x_1 = 2$ und $x_2 = -2$

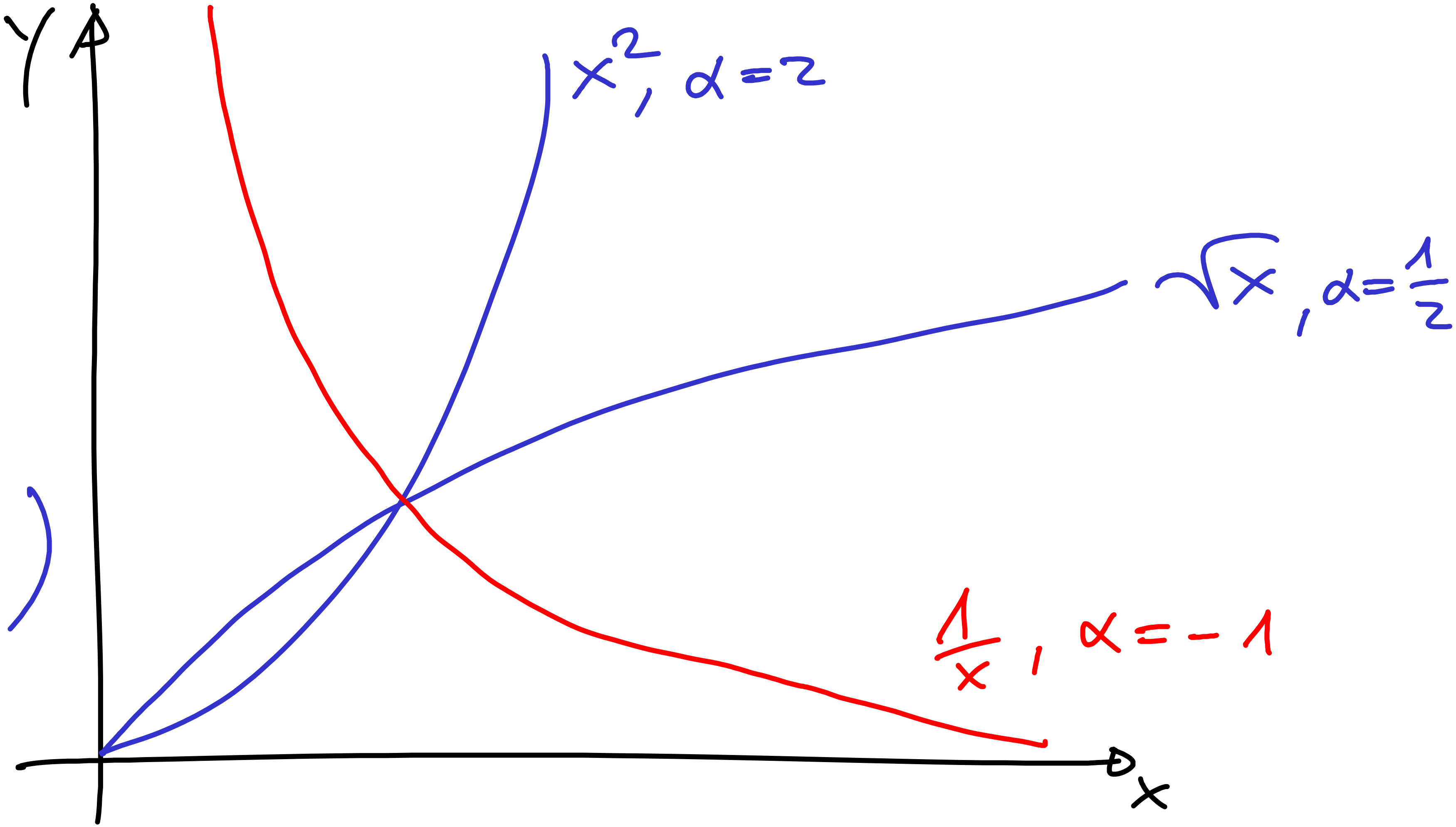
also ist f nicht injektiv


$f_2(x) = x^2$
$\mathbb{R}_0^- \to \mathbb{R}_0^+$
y
$f_1(x) = x^2$
$\mathbb{R}_0^+ \to \mathbb{R}_0^+$
$f_1^{-1}(x) = \sqrt{x}$
x
$f_2^{-1}(x) = -\sqrt{x}$

$\alpha > 0$

$\alpha < 0$

$\left(f(x) = x^{\alpha} \right)$



f streng monoton wachsend / fallend

$x \neq y$

entweder

(i) $x > y \Rightarrow f(x) \underset{<}{\geq} f(y)$

oder

(i) $x < y \Rightarrow f(x) \underset{>}{\leq} f(y)$

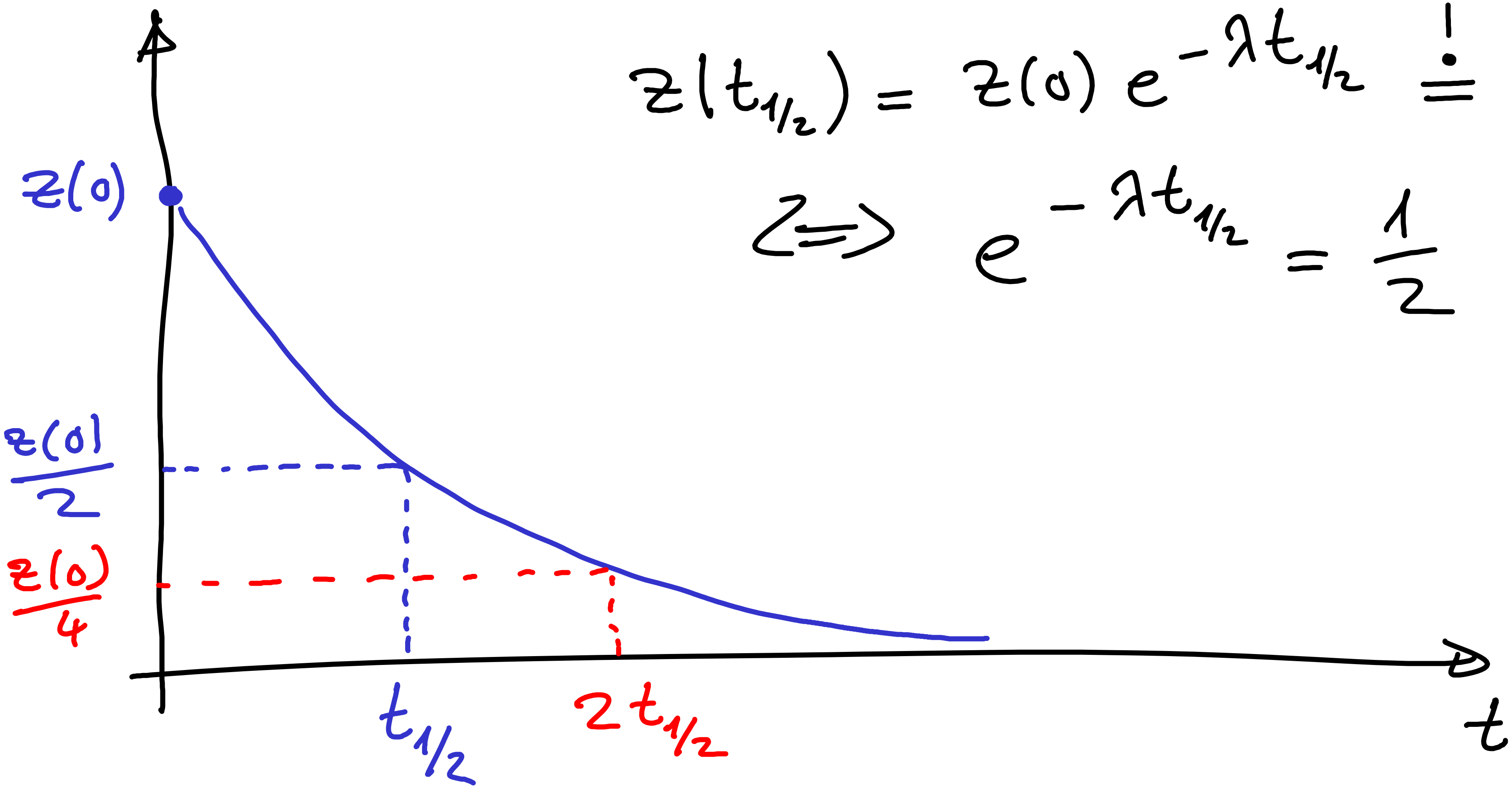
$\Rightarrow f(x) \neq f(y)$

$\square$

$$z(t) = z(0)\, e^{-\lambda t}\,, \quad \lambda > 0$$

$$z(t_{1/2}) = z(0)\, e^{-\lambda t_{1/2}} \stackrel{!}{=} \frac{z(0)}{2}$$

$$\iff e^{-\lambda t_{1/2}} = \frac{1}{2}$$



$$e^{-\lambda t_{1/2}} = \frac{1}{2}$$

Logarithmieren

$$\Leftrightarrow \quad -\lambda t_{1/2} = \log\left(\frac{1}{2}\right)$$

$$= -\log 2$$

$$\Leftrightarrow \quad \lambda = \frac{\log 2}{t_{1/2}}$$

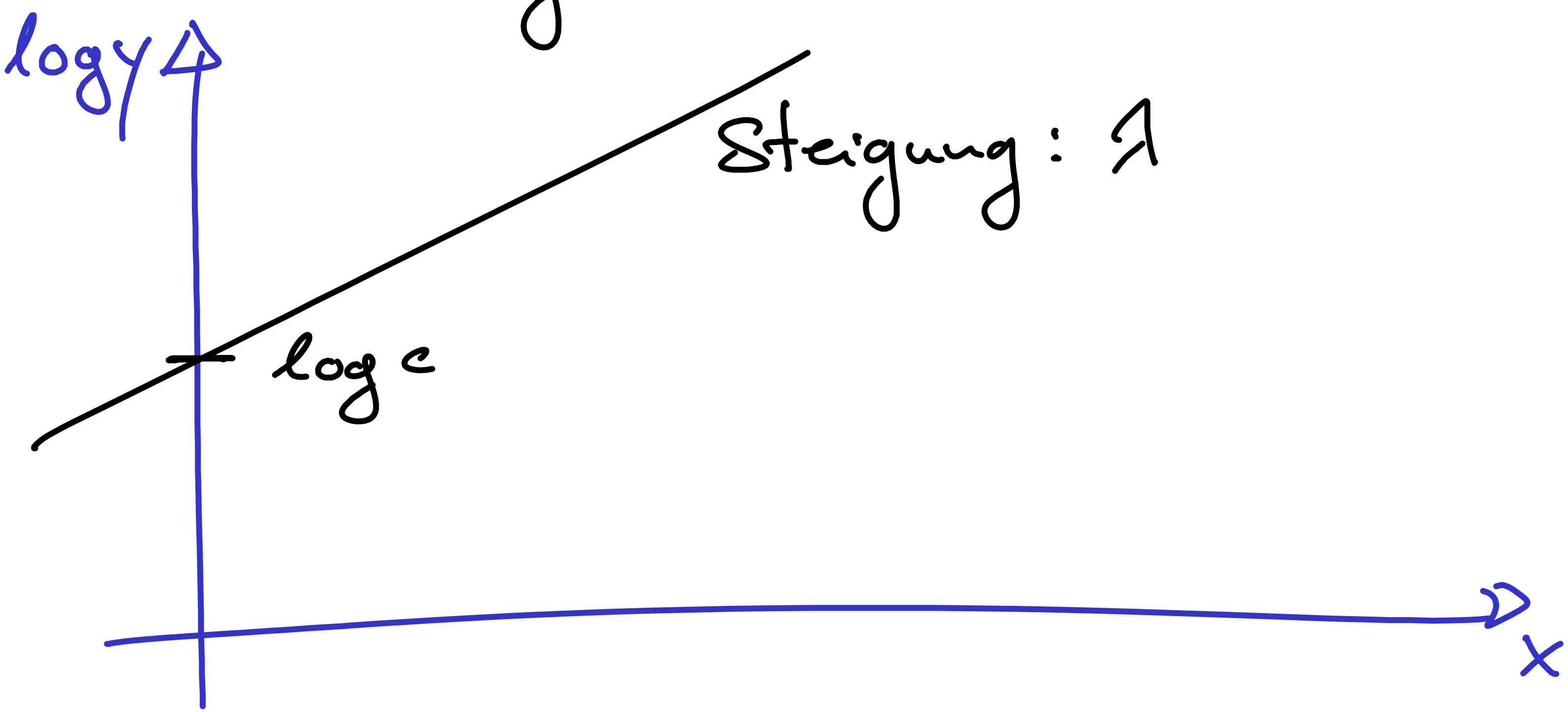
$$\Leftrightarrow \quad t_{1/2} = \frac{\log 2}{\lambda}$$

Logarithmische Skaleneinteilung

...	0,01	0,1	1	10	100	...	x
	10^{-2}	10^{-1}	10^{0}	10^{1}	10^{2}		
	$-2\log 10$	$-\log 10$	0	$1\cdot\log 10$	$2\cdot\log 10$		$\log x$
	-2	-1	1	2	3		$\log_{10} x$

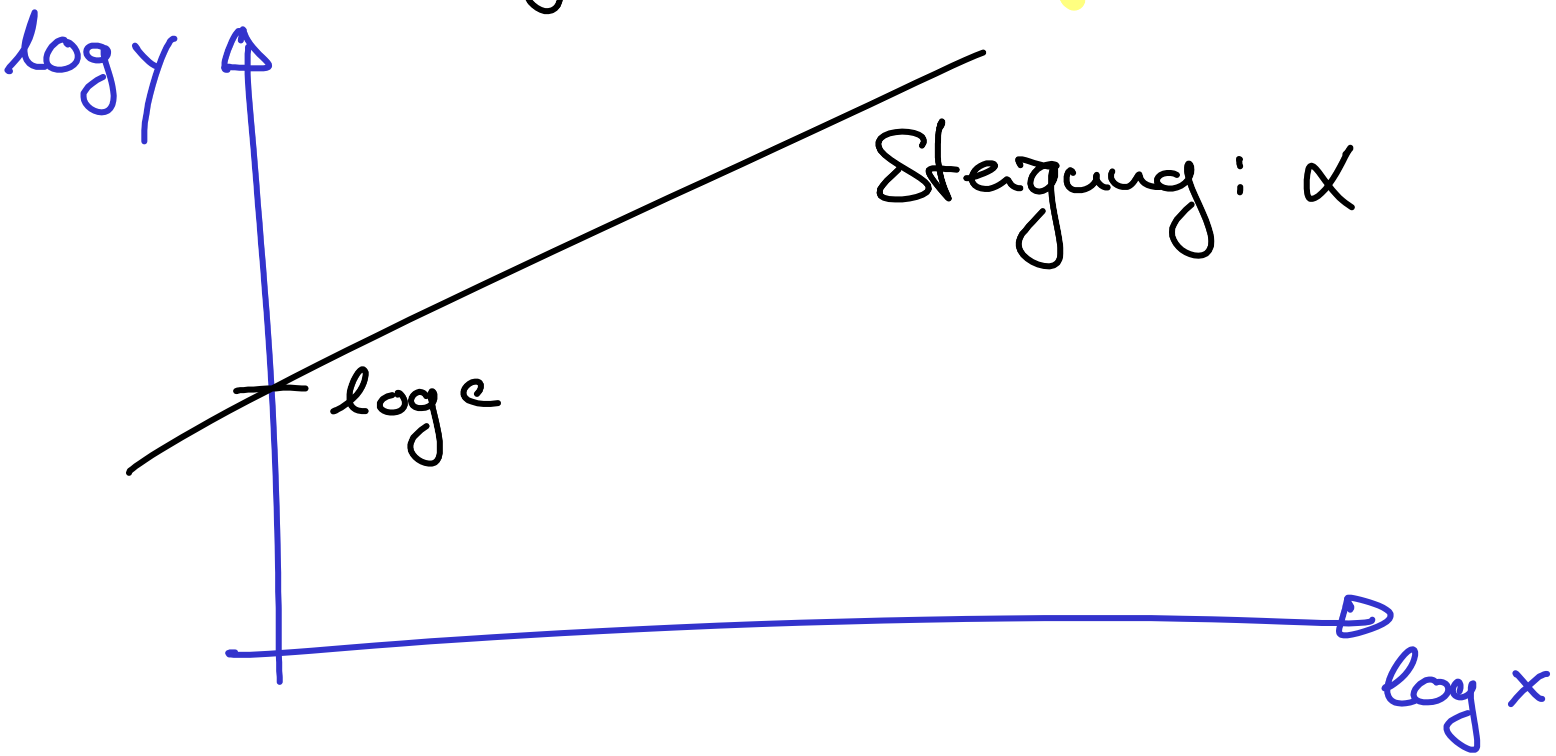
$$y = c\, e^{\lambda x}, \quad c, \lambda \in \mathbb{R}$$

$$\begin{aligned} \log y &= \log\left(c \cdot e^{\lambda x}\right) \\ &= \log c + \log\left(e^{\lambda x}\right) \\ &= \log c + \lambda x \end{aligned}$$



$$y = c\,x^{\alpha}\ , \quad c, \alpha \in \mathbb{R}$$

$$\log y = \log(c \cdot x^{\alpha})$$
$$= \log c + \alpha \log x$$



$$\log x = \log\left(\alpha^{\log_\alpha x}\right)$$

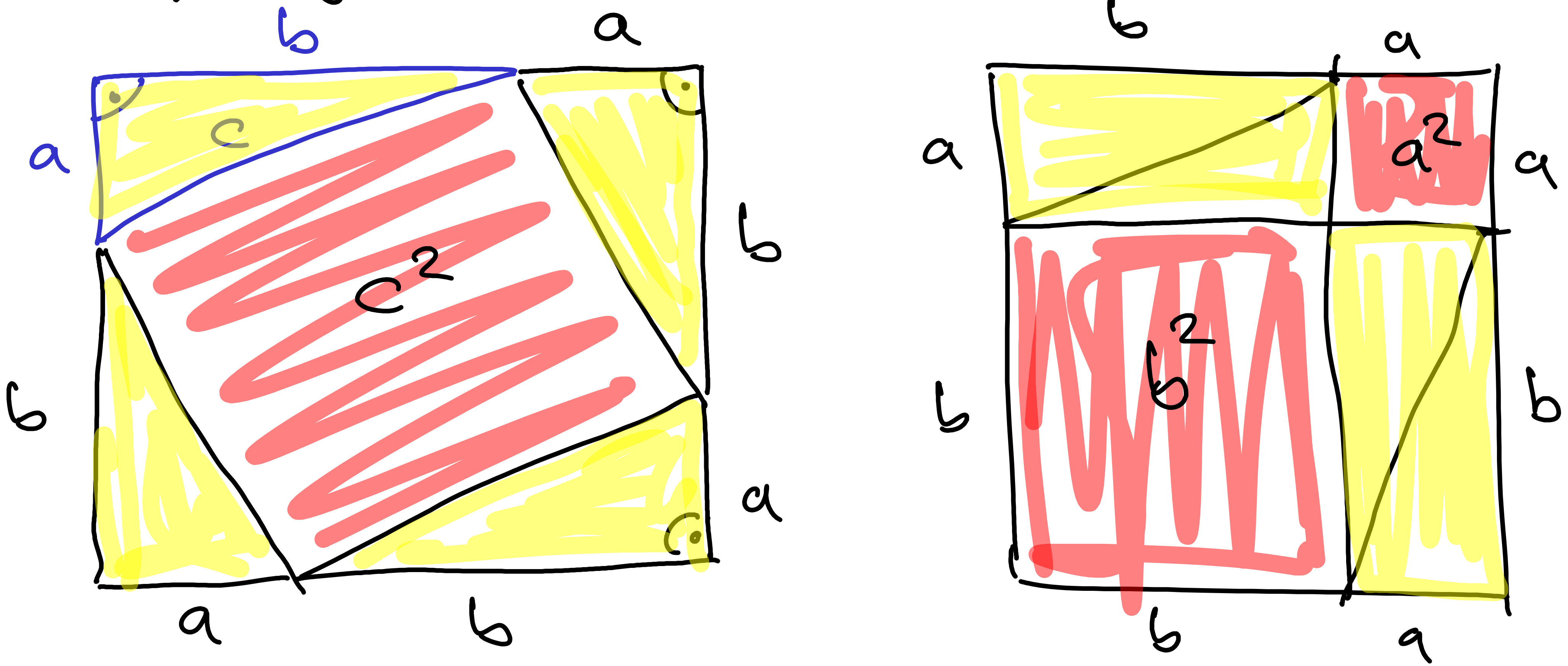
$$= \log_\alpha x \cdot \log \alpha$$

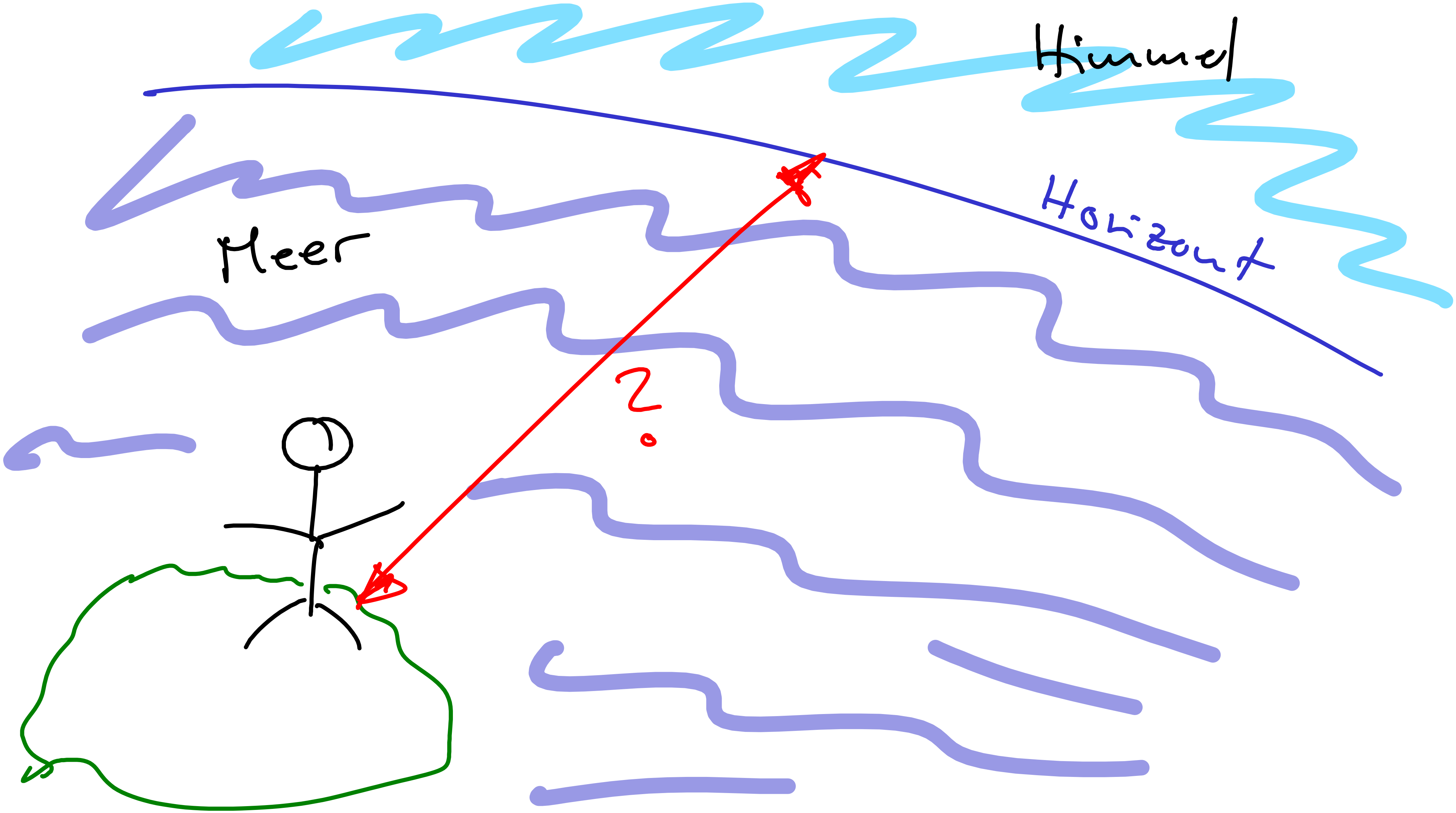
$\Longleftrightarrow$

$\alpha \neq 1$

$$\log_\alpha x = \frac{\log x}{\log \alpha}$$

Pythagoras

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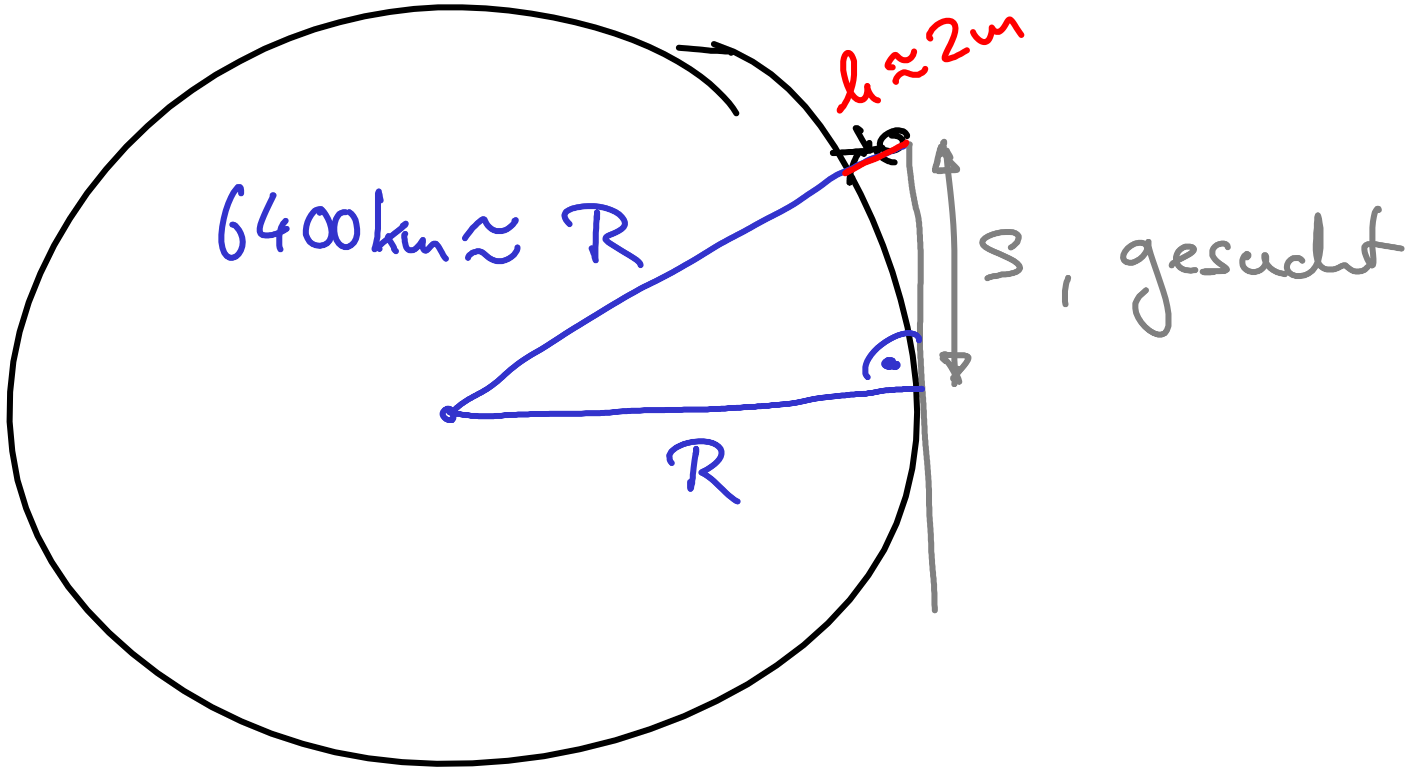


$$(R+h)^2 = R^2 + s^2 \quad \text{(Pythagoras)}$$

Auflösen nach s oder...

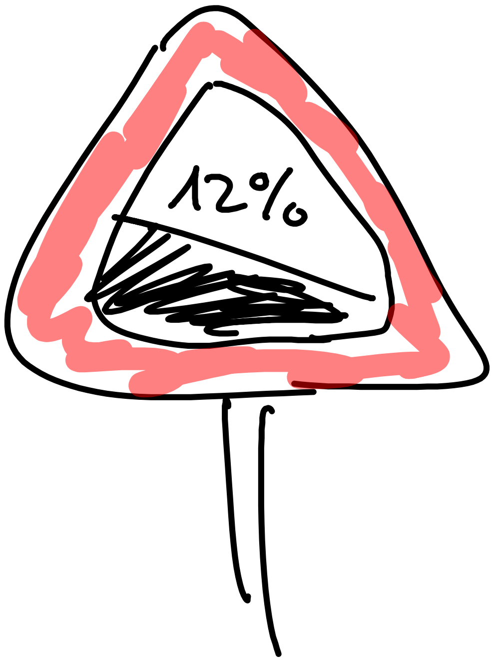
$$\Leftrightarrow \quad \cancel{R^2} + 2Rh + h^2 = \cancel{R^2} + s^2$$

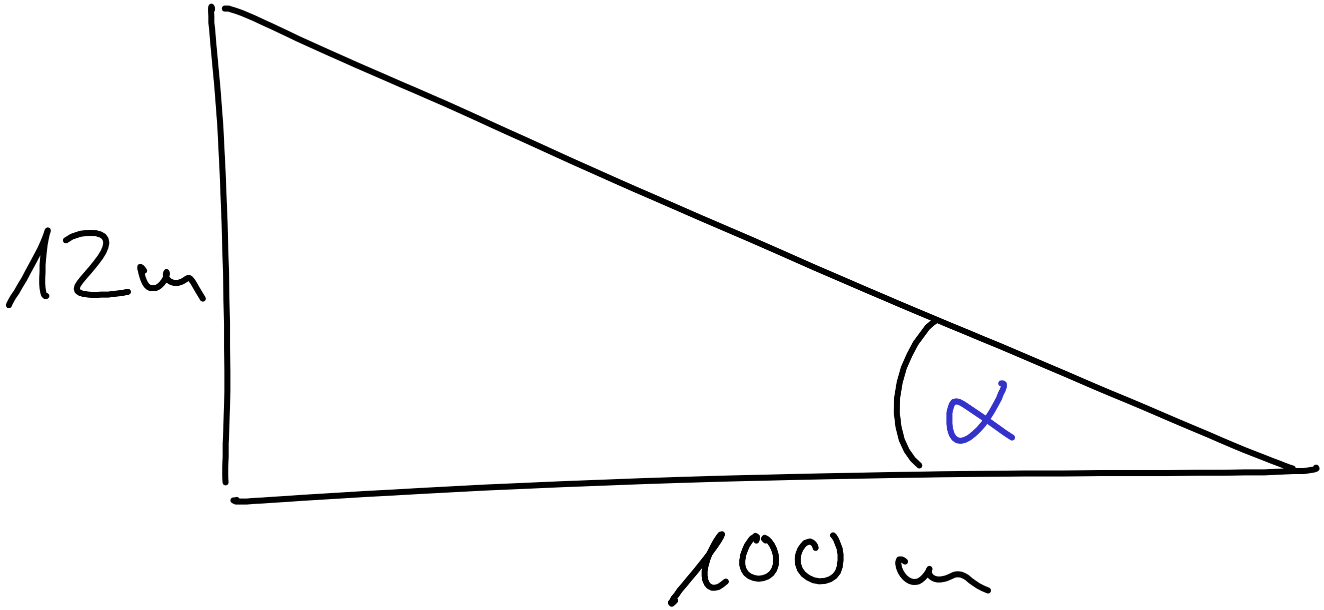
$$\Rightarrow \quad s^2 \approx 2Rh \qquad \text{da } h \ll R$$

$$s = \sqrt{2Rh}$$

$$= \sqrt{2 \cdot 6400\,\text{km} \cdot 2\,\text{m}}$$

$$\approx \sqrt{25\,\text{km}^2} = \underline{\underline{5\,\text{km}}}$$





$$\tan \alpha = \frac{12m}{100m} = 0{,}12 = 12\%$$