Aufgabe 1)

- $f(x) = c \cdot a^x$ und $f(y) = \log_a(y) = Y$

$$\log_a(y) = \log_a(c \cdot a^x)$$
$$\Rightarrow \log_a(c) + \log_a(a^x)$$
$$Y = \log_a(c) + X$$

- $f(x) = c \cdot x^a$ und $f(x) = \log(x) = X$ und $f(y) = \log(y) = Y$

$$\log(y) = \log(c \cdot x^a)$$
$$\Rightarrow \log(c) + \log(x^a)$$
$$\Rightarrow \log(c) + a \cdot \log(x)$$
$$Y = \log(c) + a \cdot X$$

a)

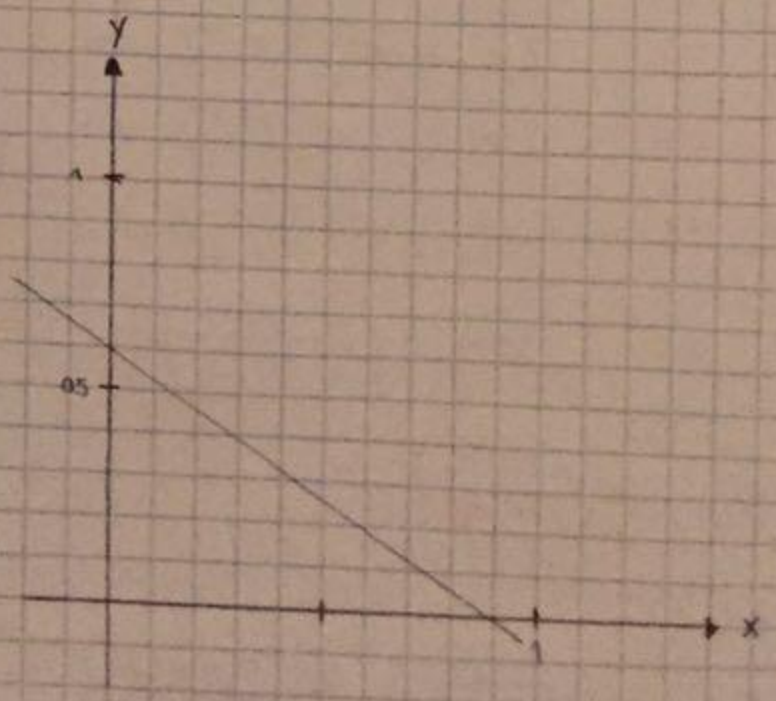
- $f(x) = \frac{5}{\sqrt[3]{2x^2}} = 5 \cdot \cancel{(2x^2)^{-\frac{2}{3}}} \; (2x^2)^{-\frac{1}{3}}$ und $f(y) = \log(y) = Y$

und $f(x) = \log(x) = X$

$$\log(y) = \log(5 \cdot (2x^2)^{-\frac{1}{3}})$$
$$\Rightarrow \log(5) + \log((2x^2)^{-\frac{1}{3}})$$
$$\Rightarrow \log(5) + (-\tfrac{1}{3}) \log(2x^2)$$
$$\Rightarrow \log(5) + (-\tfrac{1}{3})(\log(2) + \log(x^2))$$
$$\Rightarrow \log(5) + (-\tfrac{1}{3})(\log(2) + 2\log(x))$$
$$\Rightarrow \log(5) - \tfrac{1}{3}\log(2) - \tfrac{2}{3}\log(x)$$
$$\Rightarrow \log(\tfrac{5}{\sqrt[3]{2}}) - \tfrac{2}{3}\log(x)$$
$$Y = \log(\tfrac{5}{\sqrt[3]{2}}) - \tfrac{2}{3} X$$

$f(0) = \log(\frac{5}{\sqrt[3]{2}})$

$f'(x) = -\frac{2}{3}$



- $g(x) = 10^5 \cdot (2e)^{-\frac{x}{100}}$ und $g(y) = \ln(y) = Y$

$\ln(y) = \ln(10^5 \cdot (2e)^{-\frac{x}{100}})$

$\Rightarrow \ln(10^5) + \ln((2e)^{-\frac{x}{100}})$

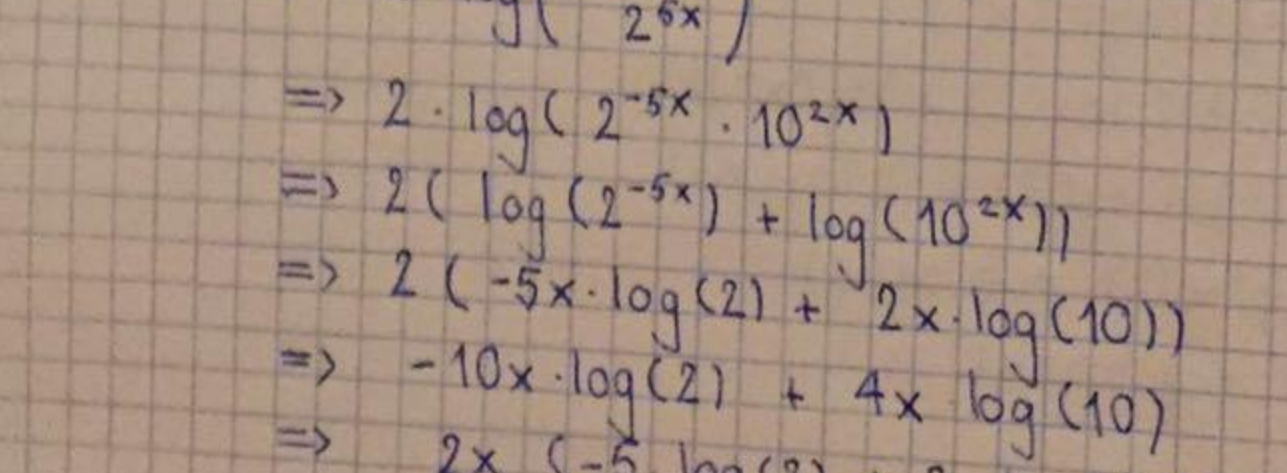
$\Rightarrow \ln(10^5) + (-\frac{1}{100}) \cdot \ln(2e) \cdot x$

$\Rightarrow \ln(10^5) + \ln((2e)^{-\frac{1}{100}}) x$

$Y = \ln(10^5) + \ln((2e)^{-\frac{1}{100}}) x$

$g(0) = \underline{\ln(10^5)}$

$g'(x) = \underline{\ln((2e)^{-\frac{1}{100}}) \approx -0.01693}$



- $h(x) = \cancel{\left(\frac{10^{2x}}{2^{5x}}\right) \cdot 2} \left(\frac{10^{2x}}{2^{5x}}\right)^2$ und $h(y) = \log(y) = Y$

$\log(y) = \log\left(\left(\frac{10^{2x}}{2^{5x}}\right)^2\right)$

$\Rightarrow 2 \cdot \log\left(\frac{10^{2x}}{2^{5x}}\right)$

$\Rightarrow 2 \cdot \log(2^{-5x} \cdot 10^{2x})$

$\Rightarrow 2(\log(2^{-5x}) + \log(10^{2x}))$

$\Rightarrow 2(-5x \cdot \log(2) + 2x \cdot \log(10))$

$\Rightarrow -10x \cdot \log(2) + 4x \cdot \log(10)$

$\Rightarrow 2x(-5 \cdot \log(2) + 2 \cdot \log(10))$

$\Rightarrow 2x(\log(2^{-5}) + \log(100))$

$\Rightarrow 2x \cdot \log(\frac{100}{2^5})$

$\Rightarrow x \cdot \log\left(\frac{10000}{1024}\right)$

$Y = x \cdot \log\left(\frac{10000}{1024}\right)$

$h(0) = 0$

$h'(x) = \log\left(\frac{10000}{1024}\right) \approx 0.9897$