Aufgabe 3b)

$$f(x) = c \cdot 2^x$$

$$\log_2(f(x)) = \log_2(c \cdot 2^x)$$

$$" = \log_2(c) + \log_2(2^x)$$

$$" = \log_2(c) + x$$

$$\log_2(f(x)) = x + c_2$$

Die Ableitung dieser Funktion wird 1
was dann auf eine lineare Funktion schliesst :

$mx + q$ mit $m = 1$ und $q = \log_2(c)$

$$f(x) = c \cdot x^2$$

$$\log(f(x)) = \log(c \cdot x^2)$$

$$= \log(c) + \log(x^2)$$

$$= \log(c) + 2\log(x)$$

$$= c_2 + 2\underbrace{\log(x)}_{t}$$

$$\log(f(x)) = c_2 + 2t$$

Graph : $mx + q$ $\quad m = 2$, $x = t$, $q = \log(c)$

(i) $f(x) = \frac{5}{\sqrt[3]{2x^2}}$

Der y-Achsenabschnitt ist q und die Steigung ist m

$$f(x) = 5 \cdot \frac{1}{(2x^2)^{\frac{1}{3}}}$$

$$f(x) = 5 \cdot (2x^2)^{-\frac{1}{3}}$$

$$\log(f(x)) = \log\left(5 \cdot (2x^2)^{-\frac{1}{3}}\right)$$

$$\log(f(x)) = \log(5) + \log\left((2x^2)^{-\frac{1}{3}}\right)$$

$$\text{"} \quad = \log(5) - \frac{1}{3}\log(2x^2)$$

$$\text{"} \quad = \log(5) - \frac{1}{3}\log(2x^2)$$

$$\text{"} \quad = \log(5) - \frac{1}{3}\cdot\left(\log(2) + \log(x^2)\right)$$

$$\text{"} \quad = \log(5) - \frac{1}{3}\log(2) - \frac{1}{3}\log(x^2)$$

$$\text{"} \quad = \log(5) - \frac{1}{3}\log(2) - \frac{2}{3}\underbrace{\log(x)}_{t}$$

$$\text{"} \quad = \log(5) - \frac{1}{3}\log(2) - \frac{2}{3}t$$

$$\log(f(x)) = \log\left(\frac{5}{\sqrt[3]{2}}\right) - \frac{2}{3}t$$

$mx + q \qquad m = -\frac{2}{3}, \quad x = t, \quad q = \log\left(\frac{5}{\sqrt[3]{2}}\right)$

(II) $g(x) = 10^5 \cdot (2e)^{-\frac{x}{100}}$ logarithmus Basis 2e

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

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

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

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

$$\log(g(x)) = \log(10^5) - 100^{-1} \cdot \log(2e) \cdot x$$

$m = -\frac{\log(2e)}{100}$, $q = \log(10^5)$, $x = x$

(III) $h(x) = \left(\frac{10^{2x}}{2^{5x}}\right)^2$

$$h(x) = \frac{10^{4x}}{2^{10x}}$$

$$h(x) = 10^{4x} \cdot 2^{-10x}$$

$$\log(h(x)) = \log(10^{4x}) + \log(2^{-10x})$$

$$\log(h(x)) = 4x \cdot \log(10) - 10x \cdot \log(2)$$

$$\log(h(x)) = x(4\log(10) - 10\log(2))$$

$m = 4\log(10) - 10\log(2)$

$q = 0$

$x = x$