S 174 Nr. 2

$$3\ln e^{5} - 2\cdot\left(e^{2\ln 2} + \ln \frac{1}{\sqrt[4]{e}}\right) + \frac{10}{e^{\ln\sqrt{4}}} + \frac{1}{2}\cdot e^{\ln 3}$$

$$3\cdot 5 - 2\cdot\left(e^{\ln 2^2} + \ln e^{-1/4}\right) + \frac{10}{\sqrt{4}} + \frac{1}{2}\cdot 3$$

$$15 - 2\cdot\left(4 - 1/4\right) + 5 + 3/2$$

$$15 - 8 + 1/2 + 5 + 3/2 = 14$$

$$16^{\operatorname{ld}\sqrt{3}} = (2^4)^{\operatorname{ld} 3^{1/2}} = 2^{4\cdot \operatorname{ld} 3^{1/2}} = 2^{\operatorname{ld}(3^{1/2})^4} = 3^2 = 9$$

$$\sqrt[4]{e} = e^{1/4} = e^{(4)^{-1}}$$

$$\frac{1}{\sqrt[4]{e}} = \frac{1}{e^{1/4}} = (e^{1/4})^{-1} = e^{-1/4}$$

1) $\frac{1}{4} \log(256x^8) - 2\lg \frac{\sqrt{9}}{x^2} - \frac{1}{2} \cdot \log \frac{x^4}{9} = \frac{3}{2} \cdot \log(9x^4) + 3 \cdot \log \frac{1}{2x^3}$

$+ 4 \cdot \lg(27x)^{1/2}$

$\log\left((2x)^8\right)^{1/4} - \log\left(\frac{3}{x^2}\right)^2 - \log\left(\frac{x^4}{9}\right)^{1/2} = \log(9x^4)^{3/2}$

$+ \log\left(\frac{1}{2x^3}\right)^3 + \log\left((27x)^{1/2}\right)^4$

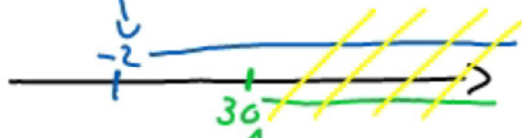
$\log \dfrac{2^2 x^2}{\frac{3^2}{x^4} \; \frac{x^2}{3}} = \log \; 3^3 x^6 \cdot \frac{1}{2^3 x^9} \; 3^6 \; x^2 \qquad | \uparrow 10^x$

$\dfrac{2^2 x^4}{3} = \dfrac{3^9}{x\, 2^3} \qquad | \cdot x \; \cdot 3 \; : 2^2$

$x^5 = \dfrac{3^{10}}{2^5} \qquad | \sqrt[5]{\;} \qquad x = \dfrac{3^2}{2} = 9/2 = 4{,}5$

4) $\log\left(\sqrt{2x+4} - 8\right) - 12$

$x = -2 \quad \Rightarrow \quad \mathbb{D}_{\sqrt{\ }} = x \in \mathbb{R}^{\geq -2}$



$\sqrt{2x+4} - 8 = 0 \quad | +8$

$\sqrt{2x+4} = 8 \quad | \ ()^2$

$2x + 4 = 64 \quad | -4 \ \cdot \tfrac{1}{2}$

$x = 30$

$\Rightarrow \quad \mathbb{D}_{\log} = x \in \mathbb{R}^{>30}$

$\mathbb{D} = x \in \mathbb{R}^{>30} \qquad \mathbb{W} = y \in \mathbb{R}$

$\lim\limits_{x \to 30} f(x) = \left[\log\left(\sqrt{64} - 8\right)\right] = \log(0^+) = -\infty$

$\lim\limits_{x \to \infty} f(x) = \log\sqrt{\infty} - 8) = \log(\infty) = \infty$

$$x^2 + 2ax + a^2 = (x+a)^2$$

$$f(x) = x^2 + 6x + 8$$

$$\downarrow \sqrt{} \qquad \downarrow \cdot \tfrac{1}{2}$$

$$(x+3)^2 - 3^2 + 8 = (x+3)^2 - 1 \Rightarrow S(-3\,|\,-1)$$

$$-\uparrow^2$$

$$(x+a)^2 + b \to S(-a\,|\,b)$$

$$f(x) = x^2 + \overset{p}{a}\cdot x + \overset{q}{b}$$

$$\left(x+\frac{a}{2}\right)^2 - \left(\frac{a}{2}\right)^2 + b = 0 \Rightarrow S\left(-\frac{a}{2}\,\middle|\,b-\left(\frac{a}{2}\right)^2\right)$$

$$\left(x+\frac{a}{2}\right)^2 = \left(\frac{a}{2}\right)^2 - b \quad |\sqrt{}$$

$$x + a/2 = \pm\sqrt{\left(\frac{a}{2}\right)^2 - b} \quad \left|-\frac{a}{2}\right.$$

$$x_{1/2} = -\overset{p}{\frac{a}{2}} \pm \sqrt{\left(\frac{a}{2}^{p}\right)^2 - b^{q}}$$

5) $f(x) = \frac{1}{4}x^2 + 2x + 3$

$= \frac{1}{4}(x^2 + 8x + 12)$

$= \frac{1}{4} \cdot (x+2)(x+6)$

-> nach oben geöffnet, da $\frac{1}{4} > 0$

-> gestaucht, da $|\frac{1}{4}| < 1$

-> $S_y(0|3)$

-> $S_{x_1}(-2|0)$ $S_{x_2}(-6|0)$

-> $S(-4|f(-4)) = S(-4|-1)$

8) $x^6 = 7x^3 + 8 \quad | -7x^3 - 8$

$x^6 - 7x^3 - 8 = (x^3 - 8) \cdot (x^3 + 1)$

$x_1 = \sqrt[3]{+8} = +2$

$x_2 = \sqrt[3]{-1} = -1$