2) $6\cdot \ln \sqrt[3]{3} - 4\cdot\left[\ln\sqrt{\frac{\sqrt{2}}{x}} + \frac{1}{2}\cdot\ln\frac{9}{x}\right] = 2\cdot\ln\frac{\sqrt{x^3}}{3} - \frac{1}{4}\ln(16x^8) + 3\ln\frac{8}{x^2}$

$$\ln\left((3)^{1/3}\right)^6 - \ln\left(\frac{2^{1/4}}{x^{1/2}}\right)^4 - \ln\left(\frac{9}{x}\right)^2 = \ln\left(\frac{x^{3/2}}{3}\right)^2 - \ln\left(16x^8\right)^{1/4} + \ln\left(\frac{8}{x^2}\right)^3$$

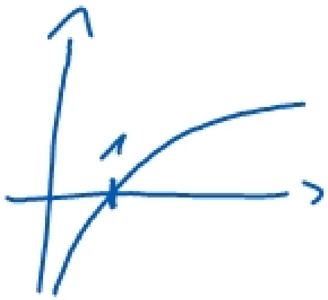
$$\ln\frac{3^2}{\frac{2}{x^2}\ \frac{9^2}{x^2}} = \ln\frac{\frac{x^3}{3^2}\ 2^9}{2x^2\ x^6} \qquad /e^x$$

$$\frac{x^4}{2\cdot 9} = \frac{2^8}{x^5\cdot 3^2} \qquad /\cdot x^5\cdot 2\cdot 9$$

$$x^9 = 2^9 \qquad /\sqrt[9]{\ }$$

$$x = 2 \qquad \mathbb{L} = \{2\}$$

5) $h(x) = \dfrac{3x}{\ln(15-3x)}$



$15 - 3x = 0 \iff x = 5 \qquad \mathbb{D}_{\ln} = x \in \mathbb{R}^{<5}$

$15 - 3x = 1 \iff x = {}^{14}/_{3} = 4\,{}^{2}/_{3}$

$\Rightarrow \mathbb{D} = x \in \mathbb{R}^{<5} \setminus \{4\,{}^{2}/_{3}\}$

$\lim\limits_{x \to 5^-} f(x) = \dfrac{15}{\ln(0^+)} = \dfrac{15}{-\infty} = 0^-$, aber $h(0) = 0$

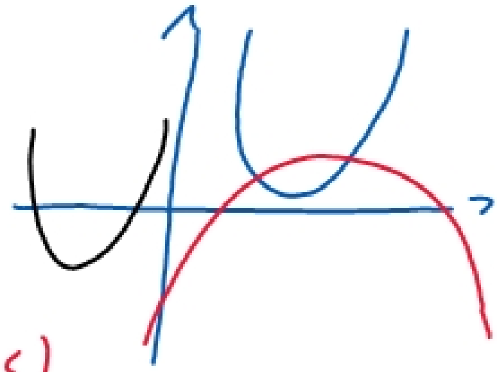
$\lim\limits_{x \to \infty} f(x) = \dfrac{\infty}{\ln(\infty)} = \dfrac{\infty}{\infty} = \infty$

$\lim\limits_{x \to 4\,{}^{2}/_{3}^{+}} f(x) = \dfrac{14}{0^+} = \infty$

$\lim\limits_{x \to 4\,{}^{2}/_{3}^{-}} f(x) = \dfrac{14}{0^-} = -\infty$

$\mathbb{W} = y \in \mathbb{R}$

$$f(x) = x^2 + p\cdot x + q \Rightarrow$$



$$f(x) = (x+a)^2 + b \Rightarrow S(-a|b)$$

$$f(x) = x^2 - 6x - 7 = 0$$

$\downarrow\sqrt{\ }$ $\quad\downarrow\cdot\frac{1}{2}$

$$(x-3)^2 - 3^2 - 7 = (x-3)^2 - 16 \Rightarrow S(3|-16)$$

$-(\ )^2$

$$(x-3)^2 - 16 = 0 \quad | +16$$

$$(x-3)^2 = 16 \quad | \sqrt{\ }$$

$$x-3 = \pm\sqrt{16} = \pm 4 \quad | +3$$

$$x_1 = -1 \vee x_2 = 7$$

$$x^2 + a \cdot x + b = 0$$

$$\left(x + \frac{a}{2}\right)^2 - \left(\frac{a}{2}\right)^2 + b = 0 \qquad \Big| + \left(\frac{a}{2}\right)^2 - b$$

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

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

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

$a = p$
$b = q$

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

$$f(x) = -2x^2 + 4x + 16$$

$$-2(x^2 - 2x - 8)$$

$$-2[(x-1)^2 - 1^2 - 8]$$

$$-2[(x-1)^2 - 9]$$

$$-2 \cdot (x-1)^2 + 18 \quad \Rightarrow \quad S(1|18)$$

7) $x^4 + 100 = 29x^2 \quad | -29x^2$

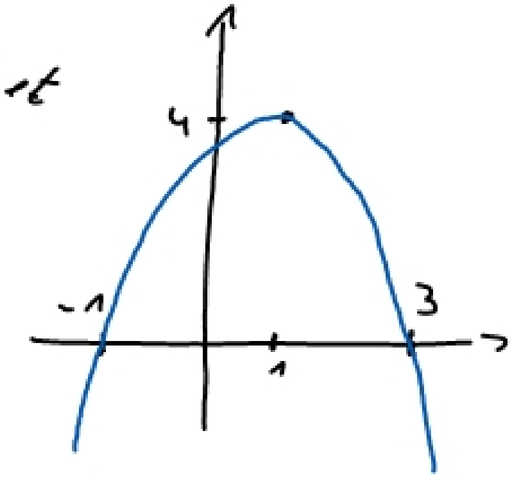
$$x^4 - 29x^2 + 100 = (x^2-4)(x^2-25)$$

$$x^2 = 4 \Rightarrow x_{1/2} = \pm 2 \quad \vee \quad x^2 = 25 \Rightarrow x_{3/4} = \pm 5$$

$$f(x) = -x^2 + 2x + 3 = -(x^2 - 2x - 3)$$

$$= -(x-3)(x+1)$$

-> Parabel ist nach unten geöffnet



-> Normalparabel

-> Achsenabschnitt $S_y(0|3)$

-> Nullstellen $S_{x_1}(3|0)$; $S_{x_2}(-1|0)$

-> Scheitelpunkt $S(1|f(1)) = S(1|4) \,\hat{=}\, HP$