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

$+ 3 \ln \left(\frac{8}{x^2}\right)$

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

$+ \ln \left(\frac{8}{x^2}\right)^3$

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

$\ln \frac{3^2 \, x^2 \, x^2}{2 \;\; 3^4} = \ln \frac{x^3 \qquad 2^9}{3^2 \;\; 2x^2 \;\; x^6}$

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

3) $f(x) = -\frac{1}{3} \ln (\underbrace{x^2 - 6x - 40}_{g(x)})$

$\mathbb{D} = \{ x \in \mathbb{R} \mid x < -4 \vee x > 10 \}$

$f[g(x)] = -\frac{1}{3} \cdot \ln [g(x)] \Rightarrow g(x) > 0$

$g(x) = 0 \quad = \quad x^2 - 6x - 40 = (x-10)(x+4) = 0$

I : $x = -100$ $\quad (-) \cdot (-) > 0$ ✓

II : $x = 0$ $\quad (-) \cdot (+) < 0$

III : $x = 1000$ $\quad (+) \cdot (+) > 0$ ✓

5) $h(x) = \dfrac{3x}{\ln(15-3x)}$ $\qquad \dfrac{K}{0}$

$\ln(15-3x)$: $15-3x>0$ $\qquad \boxed{x<5}$

$\ln(15-3x) = \ln(1) = 0$ $\qquad \wedge$

$\boxed{x \neq 14/3}$

$\mathbb{D} = \{ x \in \mathbb{R} \setminus \{\tfrac{14}{3}\} \mid x < 5 \}$

Quadratische Funktion

$$x^2 \boxed{-5}x \boxed{-6} = 0$$

Polynomdivision

Vieta

$$(x+a)(x+b)$$

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

$$x^2 + \underbrace{\boxed{(a+b)}}_{2.}\cdot x + \underbrace{\boxed{a\cdot b}}_{10}$$

a	b	Σ
(−2)	3	1
2	(−3)	−1
1	(−6)	−5
(−1)	6	5

$$(x+1)\cdot(x-6) = 0$$

$$\mathbb{L} = \{\underbrace{-1;6}_{\Delta 7}\} \longrightarrow S(2{,}5 \mid f(2{,}5))$$

$$S(2{,}5 \mid -12{,}25)$$

Quadratische Ergänzung

Jede quadratische Gleichung kann durch ein Binom dargestellt werden.

$$x^2 - 5x - 6 = (x - 5/2)^2 - (5/2)^2 - 6$$

$(x-5)^2 = x^2 - 25x + 6^2$

$$x^2 - 5x + (5/2)^2$$

$$(x - 5/2)^2 - 49/4 = 0 \quad | + \tfrac{49}{4}$$

Scheitelpunktform

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

$$(x - 5/2)^2 = 49/4 \quad | \sqrt{}$$

$$(x - 5/2) = \pm\sqrt{\tfrac{49}{4}} = \pm \tfrac{7}{2} \quad | + 5/2$$

$$S(5/2 \,|\, \tfrac{49}{4})$$

$$x_1 = \tfrac{12}{2} = 6 \quad \vee \quad x_2 = -\tfrac{7}{2} + \tfrac{5}{2} = -\tfrac{2}{2} = -1$$

$$f(x) = x^2 + 6x + 8 = 0$$

$$(x+3)^2 - 3^2 + 8 = (x+3)^2 - 9 + 8 = (x+3)^2 - 1 = 0$$

$$(x+3)^2 = 1 \quad |\sqrt{} \qquad x+3 = \pm 1$$

$$x_1 = -4 \quad \vee \quad x_2 = -2$$

$$S_{x_1}(-4|0) \ ; \ S_{x_2}(-2|0) \ ; \ S_y(0|8)$$

$$S(-3|f(-3)) = S(-3|-1)$$

$$f(x) = (x+4)(x+2) \qquad f(-3) = 1 \cdot (-1)$$

$$f_{\alpha;\beta}(x) = x^2 + \alpha \cdot x + \beta = 0$$

$$\left(x + \frac{\alpha}{2}\right)^2 - \left(\frac{\alpha}{2}\right)^2 + \beta = 0 \qquad \Big| + \frac{\alpha^*}{4} - \beta$$

$$\left(x + \frac{\alpha}{2}\right)^2 = \frac{\alpha^2}{4} - \beta \qquad \Big| \sqrt{}$$

$$x + \frac{\alpha}{2} = \pm\sqrt{\frac{\alpha^2}{4} - \beta} \qquad \Big| - \frac{\alpha}{2}$$

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

$$\alpha = p \wedge \beta = q$$

$$f(x) = 2x^2 - 8x - 42 \qquad | \cdot \tfrac{1}{2}$$

$$= 2 \cdot [x^2 - 4x - 21]$$

$$= 2 \cdot [(x-2)^2 - 2^2 - 21]$$

$$= 2 \cdot [(x-2)^2 - 25]$$

$$= 2 \cdot (x-2)^2 - 50 \quad \Rightarrow \quad S(2|-50)$$

1) $3 \cdot x^2 - 18x + 24 = 3 \cdot (x^2 - 6x + 8) = 3 \cdot (x-4)(x-2)$

$\mathbb{L} = \{2; 4\}$

2) $-\frac{1}{2} x^2 + 2x + 2{,}5 = -\frac{1}{2}(x^2 - 4x - 5) = -\frac{1}{2}(x-5)(x+1)$

$\mathbb{L} = \{-1; 5\}$

3) $2x^2 - 20x + 32 = 2(x^2 - 10x + 16) = 2 \cdot (x-2)(x-8)$

$\mathbb{L} = \{2; 8\}$