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

$$\frac{3}{2}\lg(9x^4) + 3\cdot\lg\frac{1}{2x^3} + 4\cdot\lg\sqrt{27x}$$

$$\log(2^8x^8)^{1/4} - \log\left(\frac{3}{x^2}\right)^2 - \log\left(\frac{x^4}{9}\right)^{1/2} = \log(9x^4)^{3/2} + \lg\left(\frac{1}{2x^3}\right)^3 + \log\left(\sqrt{27x}\right)^4$$

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

$$\log\frac{4x^2\,x^4\,3}{3^9\,x^2} = \log\frac{3^3x^6\,3^6\,x^2}{8x^9} \quad |\,10^x$$

$$\frac{4x^4}{3} = \frac{3^9}{8x} \quad |\cdot x \;:4\;\cdot 3$$

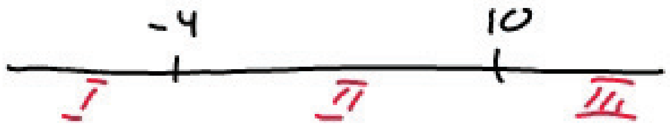
$$x^5 = \frac{3^{10}}{2^5}$$

$$x = 9/2$$

3) $f(x) = -\frac{1}{3} \cdot \ln(\underbrace{x^2 - 6x - 40}_{g(x) > 0}) = f(g(x))$

$x^2 - 6x - 40 = 0$

$(x-10)(x+4) = 0 \qquad x_1 = 10 \lor x_2 = -4$



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

I $\quad x: -100 : \ominus \cdot \ominus > 0$ ✓

II $\quad x = 0 : -40 < 0$ ↯

III $\quad x = 1000 : \oplus \cdot \oplus > 0$ ✓

4) $g(x) = \lg\left(\sqrt{2x+4} - 8\right) \mid -\boxed{12}$

1. $\sqrt{2x+4} - 8 = 0 \quad \mid +8$

$\sqrt{2x+4} = 8 \quad \mid {}^2$

$2x+4 = 64 \quad \mid -4 \quad :2$

$x = 30 \qquad x > 30$

2. $\sqrt{2x+4}$: $2x+4 = 0 \qquad x = -2$

$x \geq -2$

$\wedge$

$x \in \left]30; \infty\right[_{\mathbb{R}}$

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

$f(x) = x^2 - 2x - 8$ $\qquad S_y(0|-8)$

$x^2 \underline{-2x} \boxed{-8} = 0$

Satz von Vieta

$(x+a)(x+b) = x^2 + ax + bx + ab$

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

$(x-4)(x+2) = 0$

$x_1 = 4 \lor x_2 = -2$

$\left.\begin{array}{l} S_{x_1}(4|0) \\ S_{x_2}(-2|0) \end{array}\right\} \Delta = 6$

Scheitelpunkt $(1 \mid f(1))$

$(1 \mid -9)$

Quadratische Ergänzung

-> Jede quadratische Gleichung lässt sich als Bino- darstellen.

$$x^2 - 2x - 8 = (x \overset{\cdot 1/2}{-} 1)^2 - 1^2 - 8$$

1^2

$(x-5)^2 = x^2 - 2 \cdot 5x + 5^2$

$(x-1)^2 = (x^2 - 2x + 1) - 1^2 - 8$

$(x-1)^2 - 9 = 0 \quad | +9 \quad \Rightarrow S(1 | -9)$

$(x-1)^2 = 9 \quad | \sqrt{\ }$

$x - 1 = \pm 3 \quad | +1$

$x_1 = -2 \lor x_2 = 4$

$(x+a)^2+s \rightarrow S(-a|s)$

$S_y = (0|10)$

$S_{x_1} = (-2|0)$

$S_{x_2} = (-5|0)$

$S = (-\frac{7}{2}|-\frac{9}{4})$
TP

$f(x) = x^2 + 7x + 10$

$(x + \frac{7}{2})^2 - (\frac{7}{2})^2 + 10$

$x^2 + 7x + \boxed{(\frac{7}{2})^2}$

$\rightarrow (x + \frac{7}{2})^2 - \frac{49}{4} + 10 = (x + \frac{7}{2})^2 - \frac{9}{4} = 0 \quad | + \frac{9}{4}$

$(x + \frac{7}{2})^2 = \frac{9}{4} \quad | \sqrt{\ }$

$(x + \frac{7}{2}) = \pm \frac{3}{2} \quad | - \frac{7}{2}$

$x_1 = -\frac{4}{2} = -2 \quad \vee \quad x_2 = -\frac{10}{2} = -5$

$$ax^2 + bx + c = 0$$

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

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

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

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

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

$$\alpha = p \quad ; \quad \beta = q$$

1) $3x^2 - 18x + 24 = 3 \cdot (x^2 - 6x + 8) = 3 \cdot (x-4)(x-2) = 0$

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

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

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

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

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

$$f(x) = 2x^2 - 8x - 42$$

✓ · 1/2

$$2 \cdot (x^2 - 4x - 21)$$

$$2 \cdot [(x-2)^2 - 4 - 21]$$

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

$$2 \cdot (x-2)^2 - 50 \longrightarrow S(2 \mid -50)$$