1) $\frac{1}{4}\lg(256x^8) - 2\cdot\lg\frac{\sqrt{9}}{x^2} - \frac{1}{2}\lg\frac{x^4}{9} = \frac{3}{2}\lg(9x^4) + 3\lg\frac{1}{2x^3} + 4\cdot\lg\sqrt{27x}$

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

$$\lg\frac{2^2x^2}{\frac{3^2}{x^4}\cdot\frac{x^2}{3}} = \lg 3^3x^6\cdot\frac{1}{2^3x^9}\cdot 3^6x^2 \qquad |10^x$$

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

$$x^5 = \frac{3^{10}}{2^5} \qquad |\sqrt[5]{}$$

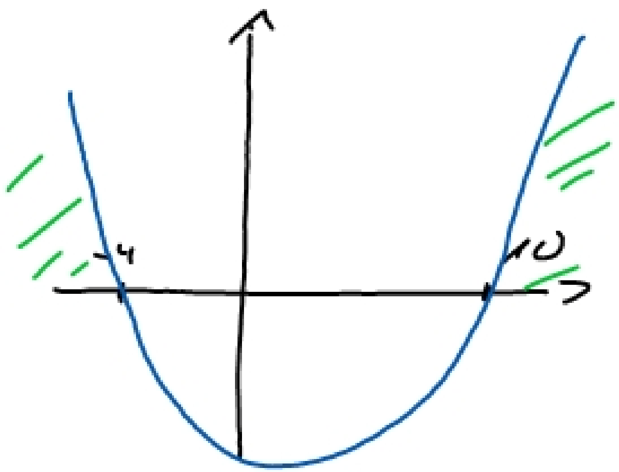
$$x = \frac{3^2}{2} = \frac{9}{2} = 4{,}5$$

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

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

$$(x-10)(x+4)=0$$

$$x_1=10 \vee x_2=-4$$



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

$$\lim_{x\to\infty} f(x) = -\frac{1}{3}\cdot\ln(\infty) = -\frac{1}{3}\cdot\infty = -\infty$$

$$\lim_{x\to 10^+} f(x) = -\frac{1}{3}\cdot\ln(0^+) = -\frac{1}{3}\cdot(-\infty)=\infty$$

$$\Rightarrow W=\mathbb{R}$$

$$f(x) = x^2 + a \cdot x + 5$$

$$f(x) = (x + \alpha)^2 + \beta \quad -> \quad S(-\alpha \,/\, \beta)$$

$$f(x) = x^2 - 4x - 12$$

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

$$(x - 2)^2 \underbrace{- 2^2}_{-?^2} - 12$$

$$(x - 2)^2 - 16 \quad -> \quad S(2 \,/\, -16)$$

$$f(x) = 0 = (x-2)^2 - 16 \qquad | +16$$

$$16 = (x-2)^2 \qquad | \sqrt{\;}$$

$$\pm\sqrt{16} = x - 2 \qquad | +2$$

$$x_{1/2} = 2 \pm 4 \qquad x_1 = 6 \;\vee\; x_2 = -2$$

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

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

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

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

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

$a = p$
$b = q$

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

Satz v. Vieta:

$$(x+a)(x+b) = x^2 + a\cdot x + b\cdot x + a\cdot b$$

$$= x^2 + (a+b)\cdot x + a\cdot b$$

$$\qquad\quad\downarrow \qquad\quad \downarrow$$

$$x^2 + p\cdot x + q$$

$$x^2 - 5x - 14 = 0$$

$$(x+2)\cdot(x-7) = 0$$

$$x_1 = -2 \lor x_2 = 7$$

$a\cdot b = -14$	$a+b = -5$
$-14\cdot 1$	-13
$14\cdot(-1)$	13
$-2\cdot 7$	5
$2\cdot(-7)$	-5

$$f(x) = -2x^2 + 4x + 16 \qquad | \cdot (-1/2)$$

$$(-1/2) \cdot f(x) = \ \ldots$$

$$f(x) = -2 \cdot (x^2 - 2x - 8)$$

$$= -2 \cdot [(x-1)^2 - 1^2 - 8]$$

$$= -2 \cdot [(x-1)^2 - 9]$$

$$= -2 \cdot (x-1)^2 + 18 \longrightarrow S(1 \mid 18)$$

5) $g(x) = \frac{1}{4}x^2 + 2x + 3 = \frac{1}{4}(x^2 + 8x + 12)$

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

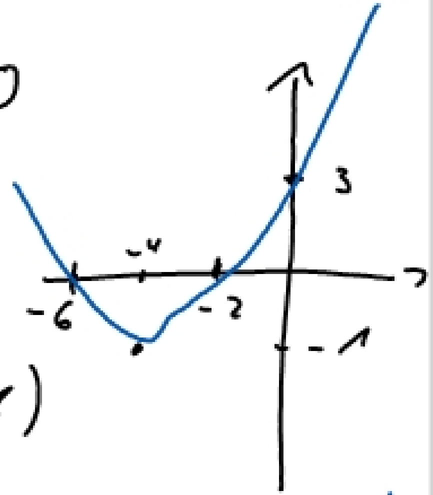
-> Parabel nach oben geöffnet, da $\frac{1}{4} > 0$

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

-> Achsenabschnitt $S_y(0|3)$

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

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



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

$x^6 - 7x^3 - 8 = 0$

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

$x^3 = 8 \Rightarrow x = 2 \quad \vee \quad x^3 = -1 \Rightarrow x = -1$