

S 184

1) $2x^2 - 8x = 10 \quad | -10$ $2x^2 - 8x - 10 = 0$ *Vieta*

$2 \cdot (x^2 - 4x - 5) = 2 \cdot (x-5)(x+1)$ $\mathbb{L} = \{-1; 5\}$

2) $3x^2 = 9x - 30 \quad | -9x + 30$ $3x^2 - 9x + 30 = 0$ $| \cdot \frac{1}{3}$

$x^2 - 3x + 10 = 0$ *p-q-Formel*

$x_{1/2} = \frac{3}{2} \pm \sqrt{\left(\frac{3}{2}\right)^2 - 10} = \frac{3}{2} \pm \sqrt{-7,75} \Rightarrow \mathbb{L} = \{\}$

3) $14x^2 + 3x + 8 = 14 \cdot (x^2 + 12x + 32) = 14 \cdot [(x+6)^2 - 6^2 + 32]$ \nearrow *S(-6|-1)*
 $= 14 \cdot [(x+6)^2 - 4] = 14 \cdot (x+6)^2 - 1$

$14 \cdot [(x+6)^2 - 4] = 0$ $| \cdot \frac{1}{14} + 4$ *Q.E*

$(x+6)^2 = 4$ $| \sqrt{\quad}$

$x+6 = \pm \sqrt{4} = \pm 2$ $| -6$

$x_1 = -8 \vee x_2 = -4$

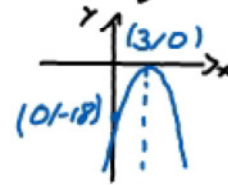
$\mathbb{L} = \{-8; -4\}$

$$4) f(x) = -2 \cdot x^2 + 12x - 18 = -2(x^2 - 6x + 9) = -2 \cdot (x-3)^2 + 0$$

→ nach unten geöffnet und um den Faktor 2 gestreckt

$$\rightarrow S = (3|0) = S_V \hat{=} HP; \quad S_y = (0|-18)$$

→ $x = 3$ ist Symmetrieachse



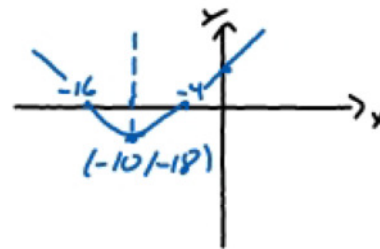
$$5) g(x) = 1/2 x^2 + 10x + 132 = 1/2 \cdot (x^2 + 20x + 64) \\ = 1/2 \cdot (x+16) \cdot (x+4)$$

→ nach oben geöffnet und um den Faktor 1/2 gestreckt

$$\rightarrow S_{y_1} = (-16|0); \quad S_{y_2} = (-4|0); \quad S_y = (0|132)$$

$$\rightarrow \text{Scheitelpunkt: } S = (-10 | f(-10)) = S = (-10 | -18) \hat{=} TP$$

→ $x = -10$ ist Symmetrieachse



$$\begin{aligned}
 6) \quad & x^4 - 24x^2 = 25 \quad | -25 \\
 & x^4 - 24x^2 - 25 = 0 \\
 & (x^2 - 25)(x^2 + 1) = 0 \\
 & (x-5) \cdot (x+5)(x^2+1) = 0 \quad \Rightarrow \mathcal{L} = \{-5; 5\}
 \end{aligned}$$

$$\begin{aligned}
 7) \quad & x^8 + 16 = 17x^4 \quad | -17x^4 \\
 & x^8 - 17x^4 + 16 = 0
 \end{aligned}$$

$$z = x^4 \quad \text{Substitution}$$

$$z^2 - 17z + 16 = 0$$

$$(z-16)(z-1) = 0$$

$$z_1 = 16 \vee z_2 = 1$$

$$x = \pm \sqrt[4]{z} \quad \text{Resubstitution}$$

$$x_{1/2} = \pm \sqrt[4]{16} ; x_{3/4} = \pm \sqrt[4]{1} \quad \Rightarrow \mathcal{L} = \{\pm 1; \pm 2\}$$

Anfänger

=> Punktrechnung mit negativen Zahlen dreht das Anzeichenzeichen um.

$$\begin{aligned}
 5x - 4 &\geq 2x + 1 && | +4 - 2x \\
 3x &\geq 5 && | \cdot \frac{1}{3} \\
 x &\geq \frac{5}{3}
 \end{aligned}$$

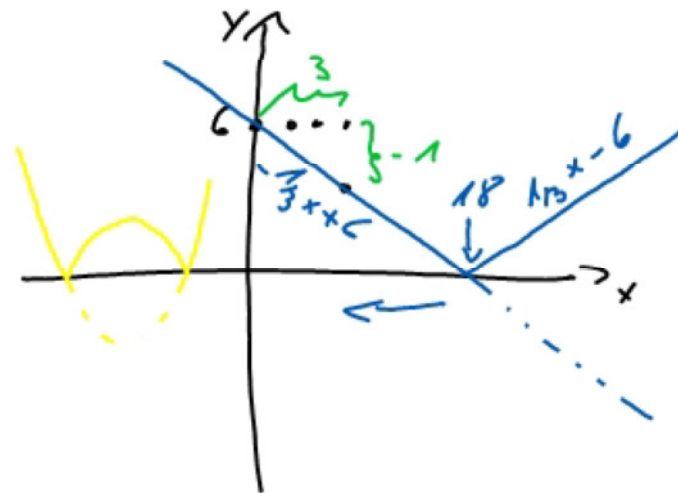
$$\begin{aligned}
 3 - 4x &< 2x + 7 && | -2x - 3 \\
 -6x &< 4 && | \cdot (-\frac{1}{6}) \\
 x &> -\frac{2}{3}
 \end{aligned}$$

Beding: $| \heartsuit | \geq 0$

$$\begin{aligned}
 & -\frac{1}{3}x + 6 \\
 | -\frac{1}{3}x + 6 | & \begin{cases} x < 18 \\ x \geq 18 \end{cases} \\
 & \begin{cases} -(-\frac{1}{3}x + 6) \\ \frac{1}{3}x - 6 \end{cases}
 \end{aligned}$$

$$y = m \cdot x + b$$

$\frac{b}{m}$ \leftarrow \downarrow S_y
 \rightarrow



S 188

4) $|3-x| < 2$

F	$x \geq 3$ δ^-	$x < 3$ δ^+
R	$-(3-x) < 2$ $-3+x < 2$ $x < 5$	$3-x < 2$ $-x < -1$ \uparrow $x > 1$ \circ
E	$x \geq 3 \wedge x < 5$	$x < 3 \wedge x > 1$
P	$x=4$: \checkmark $ 3-4 =1 < 2$	$x=2$: \checkmark $ 3-2 =1 < 2$

L

$$\begin{aligned} \mathcal{L} &= \{x \in \mathbb{R} \mid x > 1 \wedge x < 5\} \\ &= x \in]1; 5[\\ &= x \in (1; 5) \end{aligned}$$

5) $|4x-12| > 8$

F	$x \geq 3$ δ^+	$x < 3$ δ^-	F
R	$4x-12 > 8$ $4x > 20$ $x > 5$	$-(4x-12) > 8$ $-4x+12 > 8$ $-4x > -4$ $x < 1$	R
E	$x > 5$	$x < 1$	E
P	$x=6$: $ 24-12 =12 > 8$	$x=0$: $ 0-12 =12 < 8$	P

L

$$\mathcal{L} = \{x \in \mathbb{R} \mid x > 5 \vee x < 1\}$$

S 141

1) $\frac{2x-5}{4-2x} > \frac{1}{2}$, $D = x \in \mathbb{R} \setminus \{2\}$

F	$x > 2$ δ^-	$x < 2$ δ^+
R	$2x-5 < \frac{1}{2}(4-2x)$ $2x-5 < 2-x$ $3x < 7$ $x < \frac{7}{3}$	$2x-5 > \frac{1}{2}(4-2x)$ - " - $x > \frac{7}{3}$
E	$x > 2 \wedge x < \frac{7}{3}$	$x < 2 \vee x > \frac{7}{3}$
P	$x = \frac{9}{4}$: \checkmark $\frac{2 \cdot \frac{9}{4} - 5}{4 - 2 \cdot \frac{9}{4}} = 1 > \frac{1}{2}$	$x = 0$: ξ $\frac{0-5}{4-0} = -\frac{5}{4} > \frac{1}{2}$

L $\mathcal{L} = \{x \in \mathbb{R} \mid x > 2 \wedge x < \frac{7}{3}\}$
 $= x \in]2; \frac{7}{3}[$
 $= x \in (2; \frac{7}{3})$

2) $\frac{2x+1}{1+x} \geq 3$; $D = x \in \mathbb{R} \setminus \{-1\}$

F	$x > -1$ δ^+	$x < -1$ δ^-	F
R	$2x+1 \geq 3 \cdot (1+x)$ $2x+1 \geq 3+3x$ $-x \geq 2$ $x \leq -2$	$2x+1 \leq 3 \cdot (1+x)$ - " - $x \geq -2$	R
E	$x > -1 \vee x \leq -2$	$x < -1 \wedge x \geq -2$	E
P	$x = 0$: ξ $\frac{2 \cdot 0 + 1}{1+0} = 1 \geq 3$	$x = -3$: \checkmark $\frac{2 \cdot (-3) + 1}{1+(-2)} = \frac{-5}{-1} = 5 \geq 3$	P

$\mathcal{L} = \{x \in \mathbb{R} \mid x \geq -2 \wedge x < -1\}$ L
 $= x \in [-2; -1[$
 $= x \in [-2; -1)$

$$5) \quad x^3 + x + 6 > 4x^2 \quad | -4x^2$$

$$x^3 - 4x^2 + x + 6 > 0 \quad x = -1$$

$$(x^3 - 4x^2 + x + 6)(x+1) = x^2 - 5x + 6 \quad \mathcal{R}$$

$$-\frac{(x^3 + x^2)}{\quad} \quad \underbrace{\quad}_{(x-3)(x-2)}$$

$$-5x^2 + x + 6$$

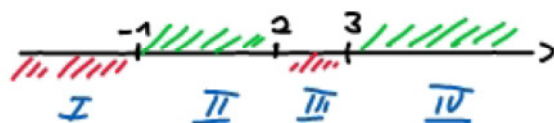
$$-\frac{(-5x^2 - 5x)}{\quad}$$

$$-6x + 6$$

$$-\frac{(6x + 6)}{\quad}$$

- -

$$(x+1) \cdot (x-2) \cdot (x-3) > 0 \quad \mathcal{E}$$



I	$x = -2$	$\ominus \cdot \ominus \cdot \ominus$	< 0	\mathcal{E}	\mathcal{P}
II	$x = 0$	$\oplus \cdot \ominus \cdot \ominus$	> 0	\checkmark	
III	$x = 2,5$	$\oplus \cdot \oplus \cdot \ominus$	< 0	\mathcal{E}	
IV	$x = 42$	$\oplus \cdot \oplus \cdot \oplus$	> 0	\checkmark	

$$\mathcal{L} = \{ x \in \mathbb{R} \mid (x > -1 \wedge x < 2) \vee x > 3 \} \quad \mathcal{L}$$

