

S 184

$$1) \quad 2x^2 - 8x = 10 \quad | -10 \quad 2x^2 - 8x - 10 = 0 \quad \text{Vieta}$$

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

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

$$x^2 - 3x + 10 = 0 \quad \text{p-q-Formel}$$

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

$$3) \quad 14x^2 + 3x + 8 = 14 \cdot (x^2 + 12x + 32) = 14 \cdot [(x+6)^2 - 6^2 + 32] \quad \begin{matrix} \nearrow \\ S(-6|-1) \end{matrix}$$

$$= 14 \cdot [(x+6)^2 - 4] = 14 \cdot (x+6)^2 - 1$$

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

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

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

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

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

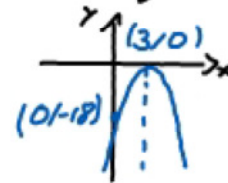
Q.E

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

→ 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



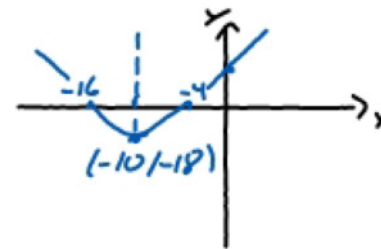
$$5) g(x) = 1/2 x^2 + 10x + 32 = 1/2 \cdot (x^2 + 20x + 64) \\ = 1/2 \cdot (x+16) \cdot (x+4)$$

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

$$\rightarrow S_{y_1} = (-16|0); \quad S_{x_2} = (-4|0); \quad S_y = (0|32)$$

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

→ $x = -10$ ist Symmetrieachse



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

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

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

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

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

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

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

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

Ungleichungen ($>$, $<$, $\geq$, $\leq$)

Punktrechnung m.d. negativ dreht das Ungleichheitszeichen um.

$$5x - 4 \geq 2x + 1 \quad | +4 - 2x$$

$$3x \geq 5 \quad | \cdot \frac{1}{3}$$

$$x \geq \frac{5}{3}$$

$$2x + 3 < 4x + 5 \quad | -3 - 4x$$

$$-2x < 2 \quad | \cdot (-\frac{1}{2})$$

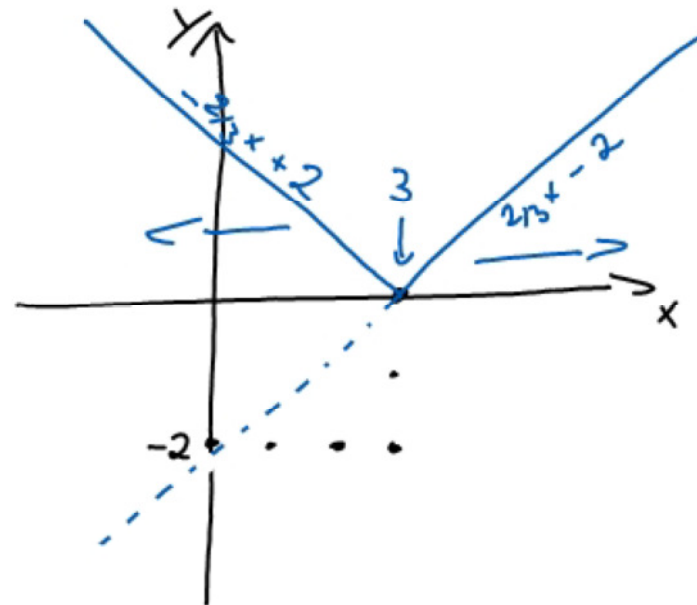
$$x > -1$$

Beding. $|x| \geq 0$

$$f(x) = \left| \frac{2}{3}x - 2 \right| \begin{cases} x \geq 3 \rightarrow \frac{2}{3}x - 2 \\ x < 3 \rightarrow -(\frac{2}{3}x - 2) \\ \quad \quad \quad -\frac{2}{3}x + 2 \end{cases}$$

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

$\downarrow$
 $\frac{p}{r}$
 $\uparrow$
 $\rightarrow$



S 188

4) $|3-x| < 2$

F	$x \geq 3$	δ^-	$x < 3$	δ^+
R	$-(3-x) < 2$		$3-x < 2$	
	$-3+x < 2$		$-x < -1$	$\uparrow$
	$x < 5$		$x > 1$	$\circ$
E	$x \geq 3 \wedge x < 5$		$x < 3 \wedge x > 1$	
P	$x=4:$	$\checkmark$	$x=2:$	$\checkmark$
	$ 3-4 =1 < 2$		$ 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) $|4x-12| > 8$

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

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

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	$2x-5 < \frac{1}{2}(4-2x)$ $2x-5 < 2-x$ $3x < 7$ $x < \frac{7}{3}$	$2x-5 > \frac{1}{2}(4-2x)$ $- \parallel -$ $x > \frac{7}{3}$
E	$x > 2 \wedge x < \frac{7}{3}$	$x < 2 \vee x > \frac{7}{3}$
P	$x = \frac{9}{4}$: $\checkmark$ $\frac{2 \cdot \frac{9}{4} - 5}{4 - 2 \cdot \frac{9}{4}} = 1 > \frac{1}{2}$	$x = 0$: f $\frac{0-5}{4-0} = -\frac{5}{4} > \frac{1}{2}$

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

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

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

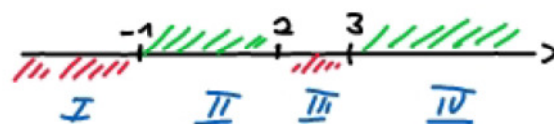
$$x^3 - 4x^2 + x + 6 > 0 \quad x = -1$$

$$(x^3 - 4x^2 + x + 6)(x+1) = x^2 - 5x + 6$$

$$\underbrace{(x-3)(x-2)}$$

$$\begin{array}{r} -(x^3 + x^2) \\ \hline -5x^2 + x + 6 \\ -(-5x^2 - 5x) \\ \hline 6x + 6 \\ -(6x + 6) \\ \hline - \end{array}$$

$$(x+1) \cdot (x-2) \cdot (x-3) > 0$$



I	$x = -2$	$\ominus \cdot \ominus \cdot \ominus$	< 0	falsch
II	$x = 0$	$\oplus \cdot \ominus \cdot \ominus$	> 0	wahr
III	$x = 2,5$	$\oplus \cdot \oplus \cdot \ominus$	< 0	falsch
IV	$x = 4,2$	$\oplus \cdot \oplus \cdot \oplus$	> 0	wahr

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

