S 184

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

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

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

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

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

$S(-6|-1)$

3) $\frac{1}{4}x^2 + 3x + 8 = \frac{1}{4} \cdot (x^2 + 12x + 32) = \frac{1}{4} \cdot [(x+6)^2 - 6^2 + 32]$

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

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

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

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

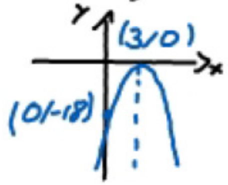
$x_1 = -8 \lor x_2 = -4 \qquad \mathbb{L} = \{-8; -4\}$

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

→ $S=(3/0) = S_x \hat{=} HP$; $S_y = (0/-18)$

→ $x = 3$ ist Symmetrieachse



5) $g(x) = \frac{1}{2}x^2 + 10x + 32 = \frac{1}{2}\cdot(x^2+20x+64)$

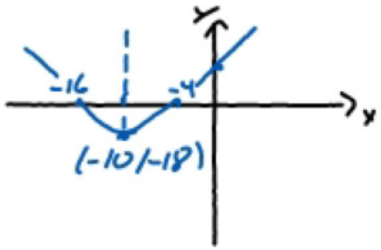
$= \frac{1}{2}\cdot(x+16)\cdot(x+4)$

→ nach oben geöffnet und um den Faktor $\frac{1}{2}$ gestaucht

→ $S_{x_1} = (-16/0)$; $S_{x_2} = (-4/0)$; $S_y = (0/32)$

→ Scheitelpunkt: $S = (-10/f(-10)) = S = (-10/-18) \hat{=} TP$

→ $x = -10$ ist Symmetrieachse



6) $x^4 - 24x^2 = 25 \quad | -25$

$x^4 - 24x^2 - 25 = 0$

$(x^2 - 25)(x^2 + 1) = 0$

$(x-5) \cdot (x+5)(x^2+1) = 0 \quad \Rightarrow \mathbb{L} = \{-5; 5\}$

7) $x^8 + 16 = 17x^4 \quad | -17x^4$

$x^8 - 17x^4 + 16 = 0$

$z = x^4$ Substitution

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

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

$z_1 = 16 \lor x_2 = 1$

$x = \pm\sqrt{z}$ Resubstitution

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

Ungleichungen

$5 - 3x \geq 11 \quad |-5$

$-3x \geq 6 \quad |\cdot(-\tfrac{1}{3})$

$x \leq -2$

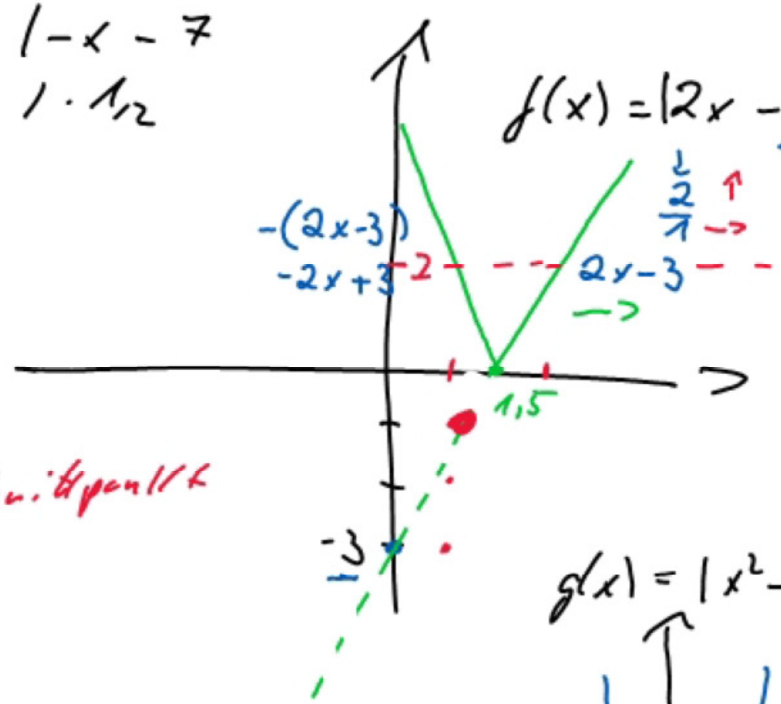
Punktrechnung mit Negativ ändert das U-Zeichen.

$7 + 3x < 3 + x \quad |-x-7$

$2x < -4 \quad |\cdot \tfrac{1}{2}$

$x < -2$

$f(x) = |2x - 3| < 2$



$y = m \cdot x + b$

y-Achsenabschnittpunkt

$y = -\tfrac{2}{3}x + 1$

$g(x) = |x^2 - 2|$

S 188

4) $|3-x| < 2$

	$x \geq 3$ $\quad \delta^-$	$x < 3$ $\quad \delta^+$
F		
R	$-(3-x) < 2$	$3-x < 2$
	$-3+x < 2$	$-x < -1$
	$x < 5$	$x > 1$
E	$x \geq 3 \wedge x < 5$	$x < 3 \wedge x > 1$
P	$x = 4$: ✓	$x = 2$: ✓
	$\lvert 3-4 \rvert = 1 < 2$	$\lvert 3-2 \rvert = 1 < 2$

L $\quad \mathbb{L} = \{x \in \mathbb{R} \mid x > 1 \wedge x < 5$

$= x \in]1;5[$

$= x \in (1;5)$

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

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

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

S 141

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

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

L $\quad \mathbb{L} = \{x \in \mathbb{R} \mid x>2 \wedge x<\frac{7}{3}\}$

$= x \in \,]2; 2\frac{1}{3}[$

$= x \in (2; 2\frac{1}{3})$

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

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

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

$= x \in [-2; -1[$

$= x \in [-2; -1)$

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

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

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

$-(x^3 + x^2)$

$/ \quad -5x^2 + x + 6$

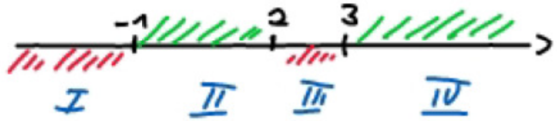
$-(-5x^2 - 5x)$

$- \quad 6x + 6$

$-(6x + 6)$

$- \quad -$

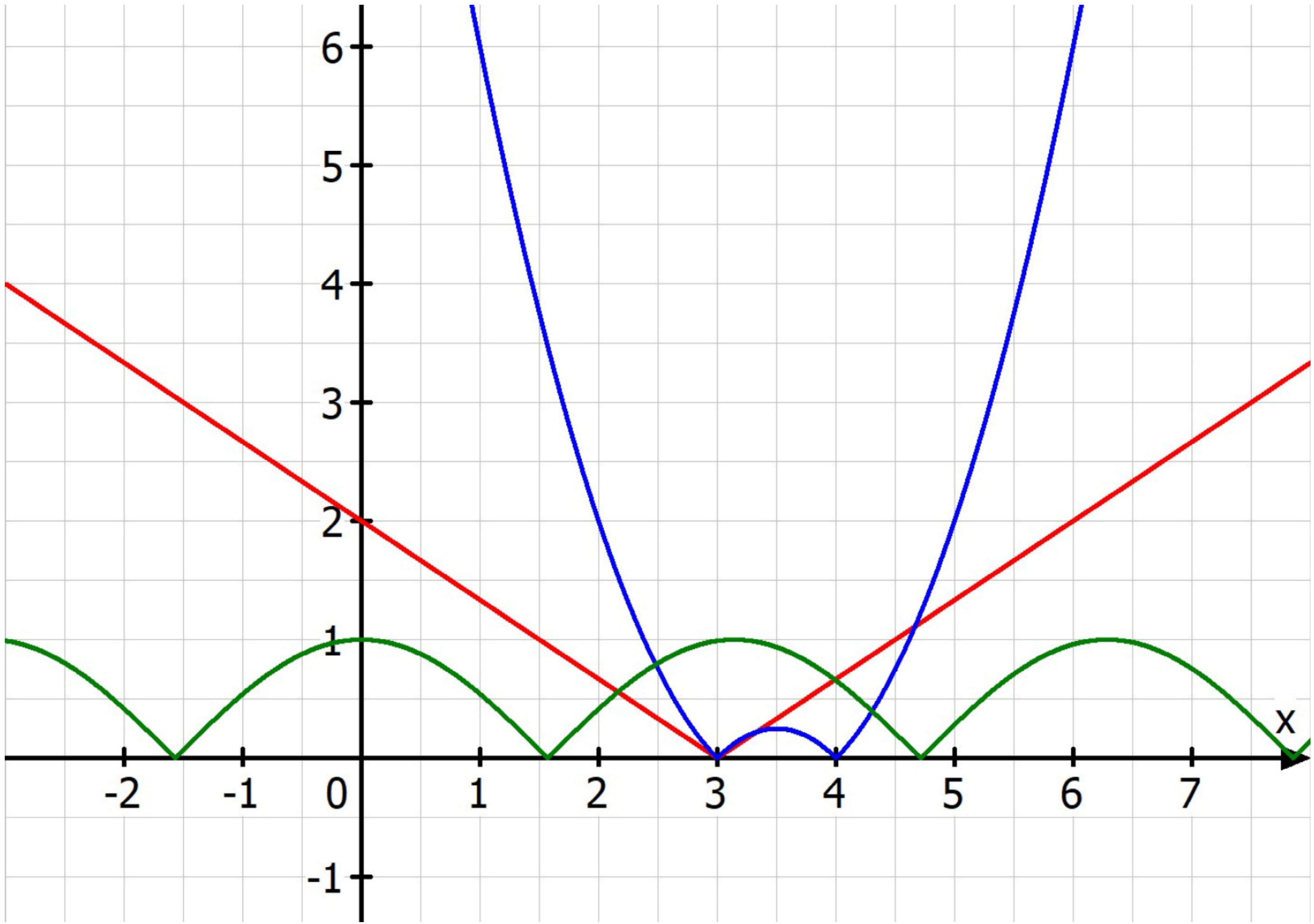
$(x+1)\cdot(x-2)\cdot(x-3) > 0$ E



I	$x = -2$	$: \ominus \cdot \ominus \cdot \ominus < 0$	↯
II	$x = 0$	$: \oplus \cdot \ominus \cdot \ominus > 0$	✓
III	$x = 2{,}5$	$: \oplus \cdot \oplus \cdot \ominus < 0$	↯
IV	$x = 42$	$: \oplus \ \oplus \cdot \oplus > 0$	✓

P

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


6
5
4
3
2
1
-1
-2
-1
0
1
2
3
4
5
6
7
x