S 195

1) $\frac{3x-2}{2-x} \leq -4$; $\mathbb{D} = x \in \mathbb{R} \setminus \{2\}$

$x > 2$	δ^-	$x < 2$	δ^+
$3x-2 \geq -4(2-x)$		$3x-2 \leq -4(2-x)$	
$3x-2 \geq -8+4x$		- " -	
$-x \geq -6$			
$x \leq 6$		$x \geq 6$	
$x > 2 \wedge x \leq 6$		$x < 2 \vee x \geq 6$	
$x = 3$ ✓		$x = 0$ ↯	
$\frac{3 \cdot 3 - 2}{2 - 3} = -7 \leq -4$		$\frac{3 \cdot 0 - 2}{2 - 0} = -1 \leq -4$	

$\mathbb{L} = \{x \in \mathbb{R} \mid x > 2 \wedge x \leq 6\}$

$= x \in]2;6]$

$= x \in (2;6]$

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

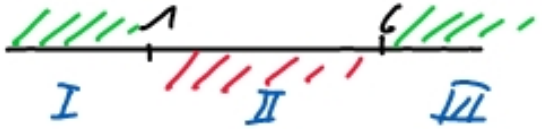
$x > -\frac{1}{2}$	δ^+	$x < -\frac{1}{2}$	δ^-
$2x^2-3 \geq (x-1)\cdot(2x+1)$		$2x^2-3 \leq (x-1)(2x+1)$	
$2x^2-3 \geq 2x^2+x-1$		- " -	
$-3 \geq x-1$			
$-2 \geq x$; $x \leq -2$		$x \geq -2$	
$x > -\frac{1}{2} \vee x \leq -2$		$x \geq -2 \wedge x < -\frac{1}{2}$	
$x = 0$ ↯		$x = -1$ ✓	
$\frac{2 \cdot 0^2 - 3}{2 \cdot 0 + 1} = -3 \geq -1$		$\frac{2(-1)^2-3}{2(-1)+1} = 1 \geq -2$	

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

$x \in [-2; -\frac{1}{2}[$

$x \in [-2; -\frac{1}{2})$

$x^2+6 < 7x \quad |-7x \qquad x^2-7x+6 = (x-6)(x-1) < 0$



I : $x = 0 : \ominus \cdot \ominus > 0$ ✗

II : $x = 2 : \ominus \cdot \oplus < 0$ ✓

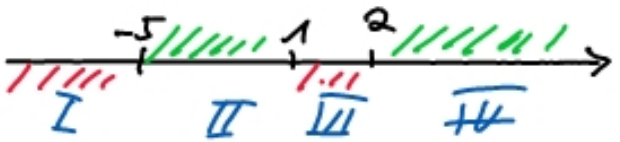
III : $x = 7 : \oplus \cdot \oplus > 0$ ✗

$\mathbb{L} = x \in]1;6[= x \in (1;6)$

4) $x \cdot (x^2+2x) > 13x - 10 \quad |-13x+10$

$x^3+2x^2-13x+10 > 0$

$(x-2)(x-1)(x+5) > 0$ ↘ Polynomdivision



I : $x = -6 : \ominus \cdot \ominus \cdot \ominus < 0$ ✗

II : $x = 0 : \ominus \cdot \ominus \cdot \oplus > 0$ ✓

III : $x = 1{,}5 : \ominus \cdot \oplus \cdot \oplus < 0$ ✗

IV : $x = 3 : \oplus \cdot \oplus \cdot \oplus > 0$ ✓

$\mathbb{L} = \{x \in \mathbb{R} \mid (x > -5 \wedge x < 1) \vee x > 2\}$

5) $|\frac{1}{2}x - 3| < 5$

$x \geq 6$ $\mathbb{J}^+$	$x < 6$ $\mathbb{J}^-$
$\frac{1}{2}x - 3 < 5$	$-(\frac{1}{2}x - 3) < 5$
$\frac{1}{2}x < 8$	$-\frac{1}{2}x + 3 < 5$
$x < 16$	$-\frac{1}{2}x < 2$
	$x > -4$
$x \geq 6 \wedge x < 16$	$x > -4 \wedge x < 6$
$x = 10$ ✓	$x = 0$ ✓
$\lvert\frac{1}{2}10 - 3\rvert = 2 < 5$	$\lvert\frac{1}{2}\cdot 0 - 3\rvert = 3 < 5$

$\mathbb{L} = \{x \in \mathbb{R} \mid x > -4 \wedge x < 16\}$

$= x \in]-4; 16[$

$= x \in (-4; 16)$

6) $|1 - 2x| > \frac{1}{4}$

$x \geq \frac{1}{2}$ $\mathbb{J}^-$	$x < \frac{1}{2}$ $\mathbb{J}^+$
$-(1 - 2x) > \frac{1}{4}$	$1 - 2x > \frac{1}{4}$
$-1 + 2x > \frac{1}{4}$	$-2x > -\frac{3}{4}$
$2x > \frac{5}{4}$	$x < \frac{3}{8}$
$x > \frac{5}{8}$	
$x > \frac{5}{8}$	$x < \frac{3}{8}$
$x = 1$ ✓	$x = 0$ ✓
$\lvert 1 - 2\rvert = 1 > \frac{1}{4}$	$\lvert 1 - 0\rvert = 1 > \frac{1}{4}$

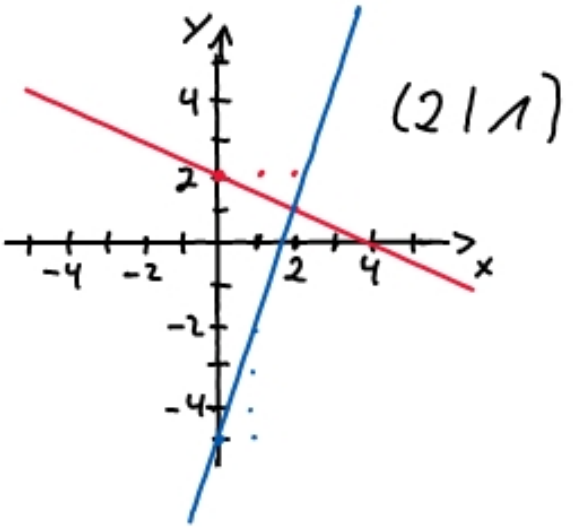
$\mathbb{L} = \{x \in \mathbb{R} \mid x > \frac{5}{8} \vee x < \frac{3}{8}\}$

$= x \in \mathbb{R} \setminus [\frac{3}{8}; \frac{5}{8}]$

$$\left|\begin{array}{l} 2y + x = 4 \\ y + 5 = 3x \end{array}\right|$$

$\Rightarrow y = -\frac{1}{2}x + 2$

$= y = 3x - 5$



(2|1)

Einsetzung

$y = 3x - 5$

$2y + x = 4$

$2 \cdot (3x - 5) + x = 4$

$6x - 10 + x = 4$

$7x = 14$

$x = 2$

$y = 3 \cdot 2 - 5 = 1$

$|+10$

$S(2|1)$

Gleichsetzung

$-\frac{1}{2}x + 2 = 3x - 5$ $\quad |-3x - 2$

$-\frac{7}{2}x = -7$ $\quad |\cdot(-\frac{1}{7})$

$x = 2$

$y = 3 \cdot 2 - 5 = 1$ $\quad S(2|1)$

Addition

$$\left|\begin{array}{l} 2y + x = 4 \\ y + 5 = 3x \end{array}\right| \Leftrightarrow \left|\begin{array}{l} x + 2y = 4 \\ -3x + y = -5 \end{array}\right| \begin{array}{l} |\cdot 3 \\ + \end{array}$$

PIVOT

$$\left|\begin{array}{l} x + 2y = 4 \\ 0 \quad 7y = 7 \end{array}\right| \Rightarrow y = 1$$

$x + 2 \cdot 1 = 4 \qquad x = 2$

$(2|1)$

$$\left|\begin{array}{l} -x + 2y - z = -5 \\ x - 3y + 2z = 8 \\ 2x - y + 5z = 13 \end{array}\right| \begin{array}{l} + \\ \\ \end{array} \quad \begin{array}{l} |\cdot 2 \\ + \end{array}$$

Pivot

$S(1|-1|2)$

$$\left|\begin{array}{l} -x + 2y - z = -5 \\ 0 \quad -y + z = 3 \\ 0 \quad 3y + 3z = 3 \end{array}\right| \begin{array}{l} \\ |\cdot 3 \\ + \end{array}$$

Pivot

$x = 1$

$-x + 2 \cdot (-1) - 2 = -5$

$$\left|\begin{array}{l} -x + 2y - z = -5 \\ 0 \quad -y + z = 3 \\ 0 \quad 0 \quad 6z = 12 \end{array}\right|$$

$z = 2$

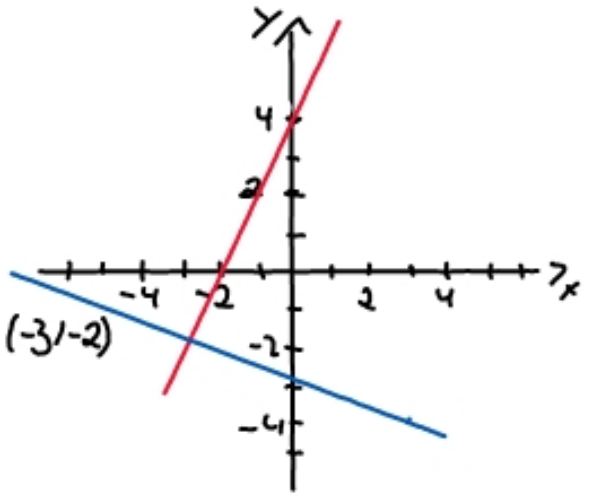
$-y + 2 = 3 \qquad y = -1$

205

1) b) $\left| \begin{array}{l} y - 2x = 4 \\ x + 3y = -9 \end{array} \right| \Rightarrow$ $y = 2x + 4$

$y = -\frac{1}{3}x - 3$

Schnittpunkt $(-3|-2)$



2) b) $\left| \begin{array}{l} 4y - 8x = 24 \\ 3y = 6x + 12 \end{array} \right| \Rightarrow 4y = 24 + 8x \quad | \cdot \frac{1}{4}$

$y = 6 + 2x$

$3 \cdot (6 + 2x) = 18 + 6x = 6x + 12 \quad | -6x$

$18 = 12$

$\Rightarrow \mathbb{L} = \{\}$

$\Rightarrow 3y = 6x + 18 \quad \ldots \quad 0 = 0 \Rightarrow \mathbb{L} = \mathbb{R}$

3) a) $\left|\begin{array}{l} 2x - y = -7 \\ 3x + 4y = 6 \end{array}\right|$ $1 \cdot 4$

$\left|\begin{array}{l} 2x - y = -7 \\ 11x = -22 \end{array}\right|$ $x = -2$ $\quad -4x - y = -7 \Rightarrow y = 3$

$S(-2\,|\,3)$

4) a) $\left|\begin{array}{l} -\frac{2}{8}x + \frac{3}{4}y = -\frac{7}{2} \\ \frac{3}{2}x - y = 7 \end{array}\right|$ $1 \cdot \frac{4}{3}$ $\quad -\frac{1}{3}x + y = -\frac{14}{3}$

$y = -\frac{14}{3} + \frac{1}{3}x$

$\longrightarrow \quad y = \frac{3}{2}x - 7$

$-\frac{14}{3} + \frac{1}{3}x = \frac{3}{2}x - 7 \quad | + \frac{14}{3} - \frac{3}{2}x$

$\frac{2}{6}x - \frac{9}{6}x = -\frac{21}{3} + \frac{14}{3}$

$-\frac{7}{6}x = -\frac{7}{3} \quad | \cdot (-\frac{6}{7})$

$x = 2$

$y = \frac{3}{2} \cdot 2 - 7 = -4$

$S(2\,|\,-4)$

206

b)

$$\left|\begin{array}{l} x + 3y - 2z = -2 \\ -2x - 5y + 2z = -1 \\ 3x + 2y - z = 2 \end{array}\right| \quad \begin{array}{l} |\cdot 2 \\ \downarrow + \\ \\ \end{array} \quad \begin{array}{l} |\cdot(-3) \\ \downarrow + \\ \\ \end{array}$$

PIVOT

$$\left|\begin{array}{l} x + 3y - 2z = -2 \\ 0 \quad y - 2z = -5 \\ 0 \quad -7y + 5z = 8 \end{array}\right| \quad \begin{array}{l} \\ |\cdot 7 \\ \downarrow + \end{array}$$

PIVOT

$$\left|\begin{array}{l} x + 3y - 2z = -2 \\ 0 \quad y - 2z = -5 \\ 0 \quad 0 - 9z = -27 \end{array}\right|$$

$x + 3\cdot 1 - 2\cdot 3 = -2$ $\qquad x = 1$

$y - 2\cdot 3 = -5$ $\qquad y = 1$

$\Rightarrow z = 3$

$S(1 \mid 1 \mid 3)$