

$$5) \quad f(x) = \frac{1}{2}x^2 + 10x + 32$$

$$= \frac{1}{2}(x^2 + 20x + 64)$$

$$= \frac{1}{2} \cdot [(x+10)^2 - 10^2 + 64]$$

$$= \frac{1}{2} \cdot [(x+10)^2 - 36]$$

$$= \frac{1}{2} \cdot (x+10)^2 - 18 \quad \rightarrow \quad S(-10 | -18)$$

$$D = \mathbb{R}$$

$$W = \mathbb{R}^{\geq -18}$$

$$S = (-10 | -18)$$

$$S_{x_1} = (-16 | 10)$$

$$S_{x_2} = (-4 | 10)$$

$$S_y = (0 | 32)$$

$$S_x: \quad f(x) = 0 \quad 0 = \frac{1}{2} \cdot (x+10)^2 - 18 \quad | +18$$

$$18 = \frac{1}{2} (x+10)^2 \quad | \cdot 2$$

$$36 = (x+10)^2 \quad | \sqrt{\quad}$$

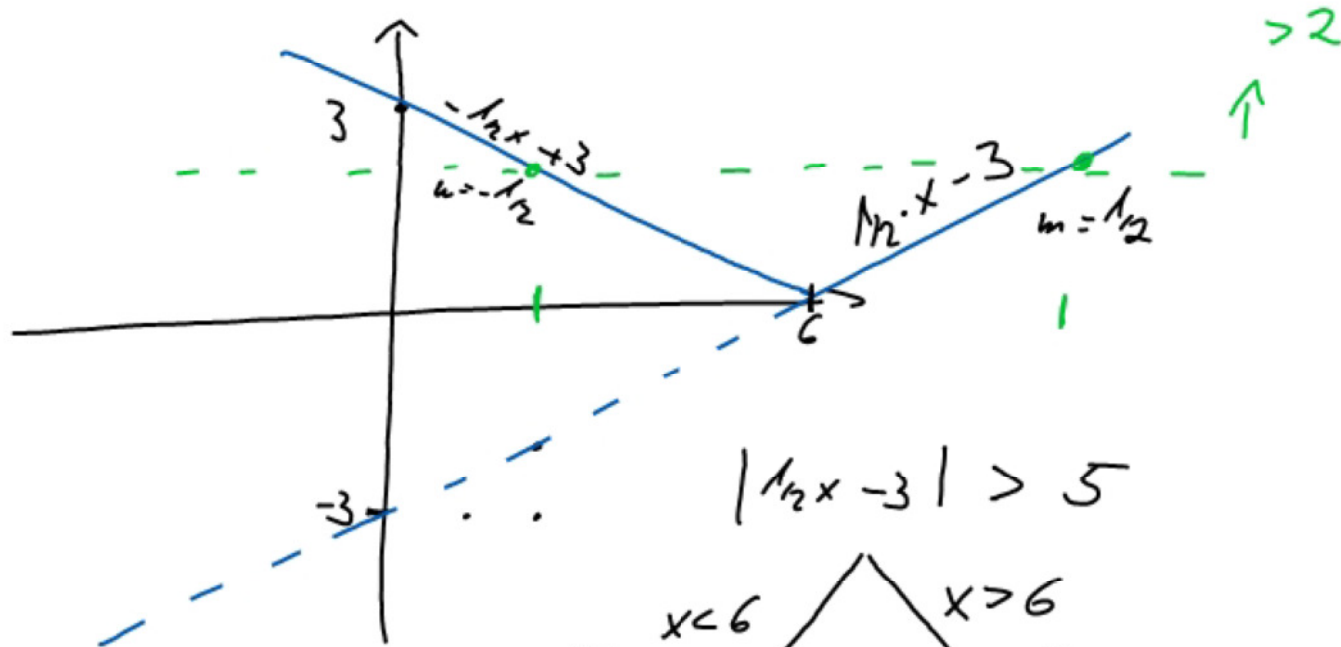
$$\pm 6 = x + 10$$

$$x_1 = -16 \quad \vee \quad x_2 = -4$$

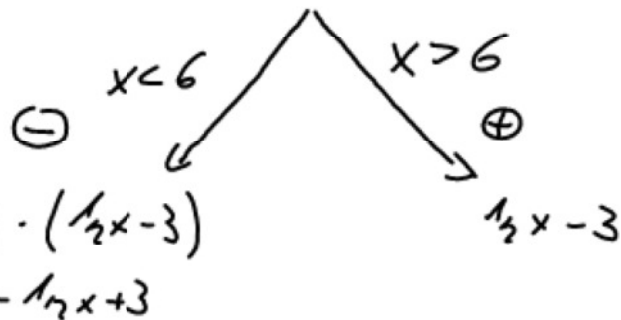
nach oben
geöffnet
und
gestreckt.

$$f(x) = \left| \frac{1}{2}x - 3 \right|$$

Betragsfunktion




$$\left| \frac{1}{2}x - 3 \right| > 5$$



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

$$\frac{1}{2}x - 3 = 0 \Leftrightarrow x = 6$$

F	$x > 6$	δ^+	$x \leq 6$	δ^-
R	$\frac{1}{2}x - 3 > 5$ $\frac{1}{2}x > 8$ $x > 16$		$-(\frac{1}{2}x - 3) > 5$ $-\frac{1}{2}x + 3 > 5$ $-\frac{1}{2}x > 2$ $x < -4$	$1 \cdot (-2)$ 
E	$x > 16$		$x < -4$	
P	$x = 20$ $ \frac{1}{2} \cdot 20 - 3 = 7 > 5$ ✓		$x = -10$ $ \frac{1}{2} \cdot (-10) - 3 = 8 > 5$ ✓	
L	$\mathcal{L} = \{x \in \mathbb{R} \mid x > 16 \vee x < -4\}$			

$$|4 - 2x| < 10$$

$$4 - 2x = 0 \quad x = 2$$

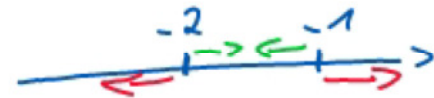
$x > 2$	δ^-	$x = 2$	δ^+
$-(4 - 2x) < 10$ $-4 + 2x < 10$ $2x < 14$ $x < 7$		$4 - 2x < 10$ $-2x < 6$ $x > -3$	
$x > 2 \wedge x < 7$		$x > -3 \wedge x \leq 2$	
$x = 3 : 4 - 6 = 2 < 10$ ✓		$x = 0 : 4 - 0 = 4 < 10$ ✓	

$$\mathcal{L} = \{x \in \mathbb{R} \mid x < 7 \wedge x > -3\}$$

$$\mathcal{L} =]-3; 7[_{\mathbb{R}}$$



$$2) \quad \frac{2x+1}{1+x} \geq 3 \quad | \cdot (1+x)$$



$x > -1$	δ^+	$x < -1$	δ^-
$2x+1 \geq 3 \cdot (1+x)$		$2x+1 \leq 3 \cdot (1+x)$	
$2x+1 \geq 3 + 3x \quad -3x-1$...	
$-x \geq 2$			
$x \leq -2$		$x \geq -2$	
$x > -1 \quad \vee \quad x \leq -2$		$x < -1 \quad \wedge \quad x \geq -2$	
$x=0 \quad \frac{0+1}{1+0} = 1 \geq 3 \quad \checkmark$		$x=-1,5 \quad \frac{-3+1}{1-1,5} = 4 \geq 3 \quad \checkmark$	

$$\mathcal{L} = x \in]-1; -2]_{\mathbb{R}}$$

Lineare Gleichungssysteme

$$\begin{cases} 2x - 3y = 4 \\ -x + 2y = -3 \end{cases} \rightarrow \underline{x} = 2y + 3$$

1. Einsetzungsverfahren:

$$2. (2y + 3) - 3y = 4y + 6 - 3y = y + 6 = 4 \Leftrightarrow y = -2$$

$$x = 2 \cdot (-2) + 3 = -1 \quad S(-1 | -2)$$

2. Gleichsetzungsverfahren:

$$\text{I: } y = \frac{2}{3}x - \frac{4}{3} \quad \text{II: } y = \frac{1}{2}x - \frac{3}{2}$$

$$\frac{2}{3}x - \frac{4}{3} = \frac{1}{2}x - \frac{3}{2} \quad | \cdot 6$$

$$4x - 8 = 3x - 9 \quad | +8 - 3x$$

$$x = -1$$

$$y = \frac{2}{3}x - \frac{4}{3} \quad \wedge \quad x = -1$$

$$y = -\frac{2}{3} - \frac{4}{3} = -\frac{6}{3} = -2$$

$$\left. \begin{array}{l} y = \frac{2}{3}x - \frac{4}{3} \\ y = -\frac{2}{3} - \frac{4}{3} = -\frac{6}{3} = -2 \end{array} \right\} S(-1 | -2)$$

3. Additionsverfahren

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

$$\left| \begin{array}{l} -x + 2y = -3 \\ y = -2 \end{array} \right| \quad \leftarrow \begin{array}{l} -x - 4 = -3 \\ x = -1 \end{array}$$

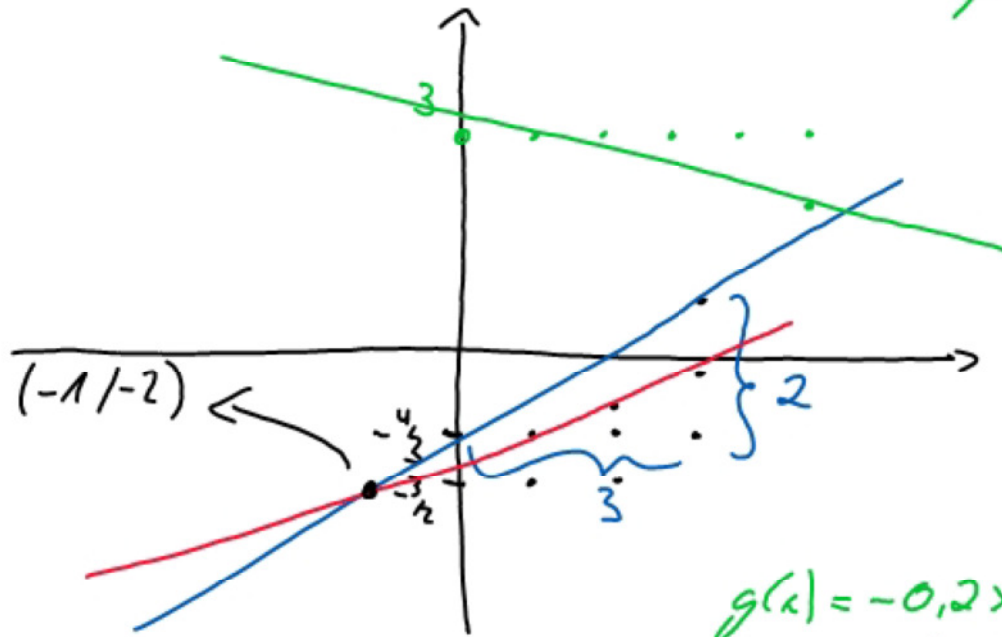
$$S(-1 | -2)$$

$$y_1 = \frac{2}{3}x_1 - \frac{4}{3}$$

$$y_2 = \frac{1}{2}x_2 - \frac{3}{2}$$

$$y = m \cdot x + b = \frac{\beta}{\alpha} \cdot x + b$$

y-Achse



$$g(x) = -0,2x + 3$$
$$- \frac{1}{5}x + 3$$

$$1) \quad \begin{cases} 2x - y = -7 \\ 3x + 4y = 6 \end{cases}$$

$$2) \quad \begin{cases} \frac{2}{3}y - 4x = -8 \\ 12x - 3y = 18 \end{cases}$$

$$3) \quad \begin{cases} y - 2x = 4 \\ x + 3y = -9 \end{cases}$$

je ein Verfahren

1) Einsetzungsverfahren: I $y = 2x + 7$

$$S(-2 | 3)$$

$$\text{II: } 3x + 4 \cdot (2x + 7) = 3x + 8x + 28 = 11x + 28 = 6$$

$$11x = -22 \quad x = -2 \Rightarrow y = -4 + 7 = 3$$

2) Additionsverfahren:

$$\begin{array}{l} \left. \begin{array}{l} -4x + \frac{2}{3}y = -8 \\ 12x - 3y = 18 \end{array} \right\} \begin{array}{l} \cdot 3 \\ + \\ \hline \end{array} \left. \begin{array}{l} -4x + \frac{2}{3}y = -8 \\ 0 - y = -6 \end{array} \right\} \begin{array}{l} x = 3 \\ y = 6 \end{array}$$

$$\begin{cases} 3x_1 + 4x_2 - x_3 = 1 \\ x_1 - x_2 + x_3 = 0 \\ 5x_1 + 2x_2 + x_3 = 2 \end{cases}$$

$$\left(\begin{array}{ccc|c} 3 & 4 & -1 & 1 \\ 1 & -1 & 1 & 0 \\ 5 & 2 & 1 & 2 \end{array} \right)$$

$$\left(\begin{array}{ccc|c} 1 & -1 & 1 & 0 \\ 3 & 4 & -1 & 1 \\ 5 & 2 & 1 & 2 \end{array} \right)$$

Pivot $1 \cdot (-3) \downarrow_+$ $1 \cdot (-5) \downarrow_+$

$$\left(\begin{array}{ccc|c} 1 & -1 & 1 & 0 \\ 0 & 7 & -4 & 1 \\ 0 & 7 & -4 & 2 \end{array} \right)$$

Pivot $1 \cdot (-1) \downarrow_+$

$$\left(\begin{array}{ccc|c} 1 & -1 & 1 & 0 \\ 0 & 7 & -4 & 1 \\ 0 & 0 & 0 & 1 \end{array} \right)$$

$\Rightarrow \mathcal{L} = \{ \}$

$$\begin{vmatrix} 2x & -y & +3z & = & 7 \\ 4x & +3y & -z & = & -3 \\ -x & +2y & -3z & = & -8 \end{vmatrix} \Rightarrow S(1|-2|1)$$

$$\left(\begin{array}{ccc|c} -1 & 2 & -3 & -8 \\ 2 & -1 & 3 & 7 \\ 4 & 3 & -1 & -3 \end{array} \right) \begin{array}{l} \text{PIVOT} \\ 1.2) \\ 1.4) \end{array}$$

$$\left(\begin{array}{ccc|c} -1 & 2 & -3 & -8 \\ 0 & 3 & -3 & -9 \\ 0 & 11 & -13 & -35 \end{array} \right) \begin{array}{l} \text{Gauß'sche} \\ \text{Stufenstruktur} \end{array}$$

$$\left(\begin{array}{ccc|c} -1 & 2 & -3 & -8 \\ 0 & -1 & 1 & 3 \\ 0 & 11 & -13 & -35 \end{array} \right) \begin{array}{l} 1.11) \\ 2=1 \\ -y+1=3 \\ -x-4-3=-8 \\ x=1 \end{array}$$

$$\left(\begin{array}{ccc|c} -1 & 2 & -3 & -8 \\ 0 & -1 & 1 & 3 \\ 0 & 0 & -2 & -2 \end{array} \right) \begin{array}{l} y=-2 \end{array}$$