

31.8.2020

Mathe A Vorlesung

Übung 2 Lösung

1

26)

- a) undefiniert \times
 b) definiert \checkmark
 c) $\sin(-100)$ ~~undefiniert~~ definiert \checkmark
 d) definiert \checkmark
 e) $\log_3(-9) \Leftrightarrow \log_3(-3^2) \Leftrightarrow 2\log_3(-3) \Rightarrow$ undefiniert \times
 f) ~~definiert~~ \checkmark undefiniert \times
 g) $\log_{-3}(-9) \Rightarrow$ undefiniert \times
 h) definiert \checkmark

2a)

$$|5-2x| < 3 \quad (\text{unter } 5-2x \geq 0)$$

$$5-2x < 3$$

$$-2x < -2 \quad | : -2$$

$$x > 1$$

$$5-2x \geq 0$$

$$x \geq 1$$

$$-2x \geq -5$$

$$x \leq -\frac{5}{2}$$

$$x \in (1, 4)$$

$$|5-2x| < 3 \quad (\text{unter } 5-2x < 0)$$

$$-5+2x < 3$$

$$2x < 8$$

$$x < 4$$

$$5-2x < 0$$

$$5-8 < 0$$

$$-3 < 0$$

b)

$$|x^2-3| < 6 \quad (\text{unter } x^2-3 \geq 0)$$

$$x^2 < 9$$

$$x < \pm 3$$

$$x < 3$$

$$x < -3$$

$$x^2-3 > 0$$

$$x^2 > 3$$

$$x > \sqrt{3}$$

$$x > \sqrt{3}$$

$$(\text{unter } x^2-3 < 0)$$

$$-x^2+3 < 6$$

$$-x^2 < 3$$

$$x^2 > -3$$

$$x > \pm \sqrt{-3}$$

$$x > \pm \sqrt{3}i$$

$$x > \pm \sqrt{3}i$$

$$x > \pm \sqrt{3}i$$

$$-x^2 < 6$$

2b)

$$|x^2 - 3| < 6 \quad (\text{antan } x^2 - 3 \geq 0)$$

$$x^2 - 3 \geq 0$$

$$x^2 \geq 3$$

$$x^2 < 9, \quad x^2 \geq 3$$

~~$$(antan x^2 - 3 < 0)$$~~

$$-x^2 + 3 \leq 0$$

$$x^2 \geq 3$$

$$|x| \geq \sqrt{3}$$

$$x \geq \sqrt{3}$$

$$x \leq -\sqrt{3}$$

$$-x^2 + 3 < 6$$

$$-x^2 < 3$$

$$x^2 < -3$$

$$x \in \sqrt{3}, i$$

illegitime

$$x^2 < 9, \quad x^2 \geq 3 \rightarrow |x| \geq \sqrt{3}$$

$$|x| < 3$$

$$x < 3$$

$$-x < 3$$

$$x > -3$$

$$x \in (-3, 3], \quad x \in [-\infty, -\sqrt{3}]$$

$$\text{antan } x^2 - 3 < 0$$

$$-x^2 + 3 < 0$$

$$-x^2 + 3 < 6$$

$$-x^2 < -3$$

$$-x^2 < 3$$

$$x^2 > 3$$

$$x^2 > -3$$

$$|x| > \sqrt{3}$$

$$x \in (\mathbb{R})$$

$$x > \sqrt{3}$$

$$x \in (-\sqrt{3}, \sqrt{3})$$

fließen

$$x \in (-\sqrt{3}, \sqrt{3})$$

$$-x > \sqrt{3}$$

$$x < -\sqrt{3}$$

fließen

$$[\sqrt{3}, \infty)$$

$$x \in (-3, -\sqrt{3}]$$

oder

$$[\sqrt{3}, 3)$$

oder auch

$$x \in (-3, 3)$$

2b)

$$|x^2 - 3| < 6$$

$$(analog) x^2 - 3 \geq 0$$

$$x^2 - 3 < 6$$

$$x^2 - 3 < 6$$

$$x^2 < 9$$

$$|x| < 3$$

$$x < 3$$

$$-x < 3$$

$$x > -3$$

$$x \in (-3, 3)$$

$$x^2 - 3 \geq 0$$

$$x^2 \geq 3$$

$$|x| \geq \sqrt{3} \Rightarrow x \geq \sqrt{3} \vee x \leq -\sqrt{3}$$

$$x \geq \sqrt{3}$$

$$-x \geq \sqrt{3}$$

$$x \leq -\sqrt{3}$$

$$x \in (-\infty, \sqrt{3}] \cup [\sqrt{3}, \infty)$$

$$x \in [-\sqrt{3}, \sqrt{3}]$$

Skizzen

$$x \in (-3, -\sqrt{3}] \cup [\sqrt{3}, 3)$$

$$(analog) x^2 - 3 < 0$$

$$-x^2 + 3 < 6$$

$$-x^2 < 3$$

$$x^2 < -3$$

$$x \in (\mathbb{R}) \downarrow$$

$$+x^2 + 3 < 0$$

$$+x^2 < -3$$

$$x^2 < -3$$

$$|x| < \sqrt{3} \rightarrow -x < \sqrt{3}$$

$$x < \sqrt{3} \cup x > -\sqrt{3}$$

Skizzen

$$x \in (-\sqrt{3}, \sqrt{3})$$

$$x \in (-3, 3)$$

$$|a-b| \leq |a-c| + |c-b|$$

$$a = -4,5$$

$$b = 1,1$$

$$|-4,5 - 1,1| = |-4,5 - c| + |c - 1,1|$$

$$5,6 = -4,5 - c + c - 1,1$$

$$5,6 \neq -5,6$$

$$c \neq 1, -4,5 - c \geq 0, c - 1,1 \geq 0$$

3a)

$$a: -$$

$$b: 1,$$

3a)

$$|a-b| = |a-c| + |c-b|$$

$$a=4,5$$

$$b=1,1$$

$$5,6 = |-4,5-c| + |c-1,1|$$

$$\text{anfang } -4,5-c \geq 0, \quad c-1,1 \geq 0$$

$$5,6 = -4,5 + c + c - 1,1$$

$$5,6 \neq -5,6$$

$$c \in \emptyset$$

OBS

$$c \leq c$$

$$\text{anfang } -4,5-c < 0, \quad c-1,1 < 0$$

$$5,6 = 4,5 + c - c + 1,1$$

$$-4,5-c < 0$$

$$c-1,1 < 0$$

$$5,6 = 5,6$$

$$-c < 4,5$$

e

$$c \in \emptyset$$

$$c > -4,5$$

$$c < 1,1$$

$$c \in (-4,5, 1,1)$$

$$\text{anfang } -4,5-c \geq 0, \quad c-1,1 \geq 0$$

$$5,6 = -4,5 - c - c + 1,1$$

$$q = -2c$$

$$-4,5-c \geq 0$$

$$c-1,1 < 0$$

$$c = -4,5$$

$$-c \geq 4,5$$

$$c \in \{-4,5\}$$

$$c \leq -4,5$$

$$c < 1,1$$

$$c = -4,5$$

$$\text{anfang } -4,5-c < 0, \quad c-1,1 \geq 0$$

$$5,6 = 4,5 + c + c - 1,1$$

$$5,6 = 3,4 + 2c$$

$$-4,5-c < 0$$

$$c-1,1 \geq 0$$

$$2c = 2,2$$

$$-c < 4,5$$

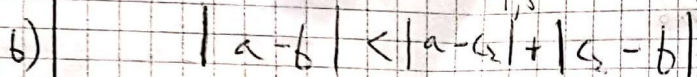
$$c = 1,1$$

$$c > 4,5$$

$$c \geq 1,1$$

$$c = 1,1$$

also summen alle lösungen auf für $c \in [-4,5, 1,1]$

$$c \in [-4,5, 1,1]$$
 ~~$\frac{1}{2}$~~
 ~~$\frac{1}{2}$~~
 $C_1 = 0$ 

6. 1, 1

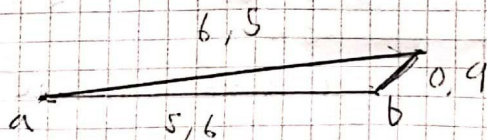
$$G_2 = 2$$

$$5,6 \leftarrow 14,5 \rightarrow 8,9$$

$$5, 6 \leftarrow \overline{2, 3, 4}$$

$$5,6 < 6,5 + 0,9$$

5,6 \leftarrow ~~7,4~~ 5,6

 (a, b)

$$y = \frac{b}{a}$$

$$f(a) = 6$$

$$D = \frac{D}{X}$$

$$C = 6 - \frac{b-a}{a-b}$$

$$c = \frac{b(a-b)}{a-b}$$

$$c = \frac{b \cdot a - b^2}{a - b}$$

$$c = \frac{-b^2 - a^2}{a - b}$$

$$C = -\frac{b^2 + a^2}{b + a}$$

$$c = -b - a$$

$$y = -\frac{b-a}{b}$$

$$y = \frac{b-a}{a-b}$$

$$a, b \in \mathbb{R}$$

$$2, 1$$

4

$$(a, b) \quad (b, a)$$

$$f(2) = 1$$

$$f(1) = 2$$

$$\underline{a \rightarrow b}$$

$$y = kx + b$$

$$y = \frac{b-a}{a-b}x + c$$

$$k = \frac{f(a) - f(b)}{a - b}$$

$$f(a) = b$$

$$\frac{b-a}{a-b} \quad \frac{b-a}{-b+a}$$

$$b = \frac{b-a}{a-b} \cdot x + c$$

$$c = b - \frac{b-a}{a-b} \cdot a$$

$$c = \frac{b(a-b)}{a-b} - \frac{b-a}{a-b} a$$

$$c = \frac{b \cdot a - b^2 - ab - a^2}{a-b}$$

$$c = \frac{-b^2 - a^2}{a-b}$$

$$c = -\frac{b^2 + a^2}{b+a}$$

$$c = -b - a$$

$$y = \frac{b-a}{-b+a}x + a - b$$

$$y = \frac{b-a}{a-b}x - (b+a)$$

5

$$5x + 3y = -4$$

$$3y = -4 - 5x$$

$$y = -\frac{5}{3}x - \frac{4}{3}$$

$$\frac{dy}{dx} = -\frac{5}{3}$$

$$y_1'(x) \cdot y_2'(x) = -1$$

$$y_2 = ax + b$$

$$y_2'(x) = a$$

$$-\frac{5}{3} \cdot a \cdot \left(-\frac{5}{3}\right) = -1$$

$$a = \frac{-1}{-\frac{5}{3}}$$

$$y_2 = \frac{3}{5}x + b$$

$$y_2(0) = 4$$

$$b = 4$$

$$y_2 = \frac{3}{5}x + 4$$

$$a = \frac{3}{5}$$