Technische Hochschule Rosenheim
Applied Artificial Intelligence - Bachelor
Analysis 1
Priv.-Doz. Dr. S.-J. Kimmerle

WiSe 2021/22

Thursday, 14.10.2021

Exercise 2 (live tutorial): bounds, inequalities, and logic

Exercise 5

Let A, B, C be three statements. Please check, whether the following linked statements are always true.

a) $(A \iff C) \implies ((A \iff B) \wedge (B \iff C))$

b) $((A \iff B) \wedge (B \iff C)) \implies (A \iff C)$

c) $((A \iff B) \wedge (B \iff C)) \iff (A \iff C)$

Exercise 6

Determine the solution sets of the following inequalities and represent the solution sets graphically:

a) $|x-5| - |x| \geq 4$

b) $2|x-1| + |y-2| \geq 1$

I $-|x-1| - |y-2|$ | $2(-(x-1)) - (y-2) \geq 1 \iff -2x+2-y+2 \geq 1 \iff -2x+3 \geq y$

II $-|x-1| + |y-2|$ | $2(-(x-1)) + y - 2 \geq 1 \iff -2x+2+y-2 \geq 1 \iff y \geq 2x+1$

III $+|x-1| - |y-2|$ | $2(+x-1) - (y-2) \geq 1 \iff 2x-2-y+2 \geq 1 \iff 2x-1 \geq y$

IV $+|x-1| + |y-2|$ | $2(+x-1) + y - 2 \geq 1 \iff 2x-2+y-2 \geq 1 \iff y \geq -2x+5$

Exercise 7

Determine the supremum in $\mathbb{R}$ of the following sets:

a)
$$A = \left\{ 1 - \frac{1}{n} \,\middle|\, n \in \mathbb{N} \right\}$$

b)
$$B = \left\{ -\frac{1}{2^n} \,\middle|\, n \in \mathbb{N} \right\}$$

c)
$$C = \left\{ 1 + (-1)^n - \frac{1}{n} \,\middle|\, n \in \mathbb{N} \right\}$$