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WIRTSCHAFTS- UND
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FAKULTÄT

Chair of Econometrics, Statistics and Empirical Economics

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Preparatory Course for Mathematical Methods in Economics and Business

2. Exercise Sheet

Exercise 1 (Linear Equations)

Solve the following equations for the unknown x:

(a) $\dfrac{1}{x-1} = \dfrac{3}{2x+3}$

(b) $\sqrt{3-x} = 2$

(c) $\sqrt[5]{5-x} = -2$

(d) $(x-6)^{\frac{1}{3}} = 2$

Exercise 2 (Quadratic Equations)

State the solution set $\mathbb{L}$ for the following equations for $x \in \mathbb{R}$:

(a) $x^2 - 10 = 3x$

(b) $3\,\dfrac{x^3-5}{x^2+5} = 3x - 5$

Exercise 3

Solve the following equations for the indicated variable:

(a) $\alpha x - a = \beta x - b$ for x

(b) $\sqrt{K} \cdot (\frac{1}{2}\frac{r}{w}K)^{\frac{1}{4}} = Q$ for K

(c) $\frac{1}{s} + \frac{1}{T} = \frac{1}{t}$ for s

(d) $\frac{x-2y+xz}{x-z} = 4y$ for z

Exercise 4 (Inequalities / Intervals)

For which x do the following inequalities hold?

(a) $-3x + 2 < 5$

(b) $\dfrac{x-1}{x+3} \leq 0$

Exercise 5 (Inequalities / Intervals)

Determine the solution set for the following inequalities:

(a) $\dfrac{x-2}{4-x} \geq 0$; $\quad x \in \mathbb{R} \setminus \{4\}$

(b) $\dfrac{3x-1}{2x+1} \leq 3$; $\quad x \in \mathbb{R} \setminus \{-\dfrac{1}{2}\}$

(c) $\dfrac{5x^2-1}{x+1} \leq 2x - 1$ $\quad x \in \mathbb{R} \setminus \{-1\}$

(d) $|x+1| \leq \dfrac{1}{2}\ |x|\ + 1$; $\quad x \in \mathbb{R}$

Exercise 6 (Absolute Values)

Determine x such that:

(a) $\mid 3 - 2x \mid = 5$

(b) $\mid x - 2 \mid \leq 1$

(c) $\mid x \mid > \sqrt{2}$

(d) $\mid x^2 - 2 \mid \leq 1$