Tutorium 2

30. November 2022 - Solution

2.1 Multiobjective Optimization

Exercise 1

On the set $U_{ad} = \{u_1, ..., u_{10}\}$ the function $J\colon U_{ad} \to \mathbb{R}^3$ is given via the following table:

$J(u_1)$	$J(u_2)$	$J(u_3)$	$J(u_4)$	$J(u_5)$	$J(u_6)$	$J(u_7)$	$J(u_8)$	$J(u_9)$	$J(u_{10})$
4	5	-6	0	10	9	-1	5	-6	10
8	-2	-3	3	5	-8	2	-1	-3	-8
6	7	-8	-3	-9	5	1	4	-8	5

Characterize all dominated and non-dominated points and specify all Pareto-optimal points.

Exercise 2

Characterize and visualize the (parameter dependent) set $\mathcal{P}$ (set of all Pareto-optimal points) of KKT-points associated to the MOP

$$\min_{u\in\mathbb{R}^2} \frac{1}{2} \begin{pmatrix} u_1^2 + pu_2^2 \\ (u_1 - 1)^2 + (u_2 - 1)^2 \end{pmatrix}$$

for $p \in \mathbb{R}$.

Exercise 3

Give an example of a differentiable MOP such that the weighted-sum method finds a point which is not Pareto optimal. Justify your answer.