Technische Universität München
Lehrstuhl Informatik VIII
Prof. Dr.-Ing. Georg Carle
Dr. Heiko Niedermayer
Cornelius Diekmann, M.Sc.

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Assignment 2

Task 1 Linear Programming - Introduction

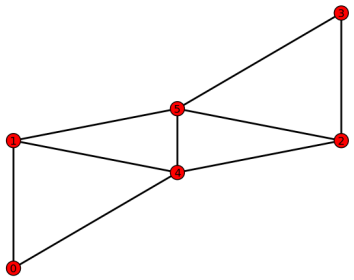
Given are the following equations $x_1 \leq 3 - x_0$, $x_1 \geq -2 + 0.25x_0$ und $x_2 = x_1 + x_0$. The cost function is $-x_0 - x_1$.

a) This optimization problem does not have a finite optimal solution. Why? What error message does the solver give?

b) Add an inequation so that is has a finite optimum. Show this by solving the problem.

Task 2 Network Optimization

Let us consider a graph with 4 nodes that produce traffic and 2 intermediate nodes that only forward messages. The following picture displays the graph. Nodes 0 and 1 are on one side, 2 and 3 on the other, 4 and 5 the forwarding nodes.



The traffic demand is: $0 \leftrightarrow 1 : 0.51$, $0 \leftrightarrow 2 : 0.25$, $1 \leftrightarrow 2 : 0.21$, $0 \leftrightarrow 1 : 0.51$, $2 \leftrightarrow 3 : 0.0.2$.
G.add_edge(0,1, cost=0.1, capacity=0.7, weight=0.1)
G.add_edge(2,3, cost=0.1, capacity=0.6, weight=0.1)
G.add_edge(4,0, cost=0.3, capacity=0.5, weight=0.1)
G.add_edge(5,1, cost=0.05, capacity=0.4, weight=0.1)
G.add_edge(4,2, cost=0.9, capacity=4, weight=0.1)
G.add_edge(5,2, cost=0.3, capacity=0.5, weight=0.1)
G.add_edge(5,3, cost=0.05, capacity=0.3, weight=0.1)
G.add_edge(4,5, cost=0.2, capacity=3, weight=0.1)
G.add_edge(4,1, cost=0.3, capacity=0.5, weight=0.1)
The objective is to optimize cost while serving the demand. It is recommended to model it as path flow problem. Select enough possible paths (e.g. up to length 4) to chose from. If you try link flow problem, note that for undirected graphs it is unclear what goes in and what goes out if there are multiple possibilities.