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Advanced Algorithms
WS 2019/20
Homework 8

27.11.2019

Exercise 1:

Prove Theorem 3.2 of the lecture.

Exercise 2:

a) Prove the following statement: If two different bases correspond to the same feasible basic solution x then x is degenerate.

b) Prove that there exists degenerate feasible basic solutions with unique corresponding basis.

Exercise 3:

Solve the following linear program using the simplex algorithm. <> means unconstrained.

$$\begin{aligned} \max\, z(x) &= x_1 - 3x_2 + x_3 \\ 3x_1 + 2x_2 &= 6 \\ 4x_1 + x_2 + 4x_3 &= 12 \\ x_1 &<> 0 \\ x_2, x_3 &\leq 0 \end{aligned}$$

Exercise 4:

Solve the following linear program using the simplex algorithm.

$$\begin{aligned} \min\, z(x) &= 6x_1 - 9x_2 \\ x_1 - x_2 &= 6 \\ 3x_1 + x_2 &\geq 1 \\ 2x_1 - 3x_2 &\geq 3 \\ x_1 &\geq 0 \\ x_2 &\leq 0 \end{aligned}$$