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Advanced Algorithms
WS 2018/19
Homework 8
26.11.2018

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.

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

Exercise 4:

Solve the following linear program using the simplex algorithm.

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