

DISCRETE OPTIMIZATION WEEK 5

EXERCISE 1

Consider an LP that has the following constraints in equational form :

$$\begin{pmatrix} 3 & -1 & 4 & 2 & 1 \\ 0 & 3 & 5 & -6 & 2 \end{pmatrix} \cdot \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{pmatrix} = \begin{pmatrix} 5 \\ 19 \end{pmatrix}$$

with $x_1, x_2, x_3, x_4, x_5 \geq 0$.

Find the basic feasible solution that has basic variables x_2, x_3 and nonbasic variables x_1, x_4, x_5 . Why is this solution indeed feasible ?

Find an objective function for which this is the unique optimal solution.

Exercise 2

Consider the following simplex tableau :

$$\begin{aligned} x_4 &= 1 - x_1 + 4x_2 - x_3 \\ x_5 &= 6 - 2x_2 - x_3 \\ x_6 &= 3 + 2x_1 - x_2 + 2x_3 \\ \hline z &= 10 - x_1 + 3x_2 + x_3 \end{aligned}$$

List all possible choices for the entering and the leaving variable in a pivot step from this tableau. Pick one of these choices and perform the pivot step