

Exercise session 1

6/11

① Solve

$$\begin{aligned} \text{(LP)} \quad & \max \quad 3x_1 + kx_2 \\ & \text{s.t.} \quad x_1 + 2x_2 \leq 8 \\ & \quad \quad 2x_1 + x_2 \leq 7 \\ & \quad \quad x_1 \geq 0 \quad x_2 \geq 0 \end{aligned}$$

with the Simplex method for $k=1$ and $k=2$

- Rewrite (LP) on standard form
- Perform Simplex iterations
- What value of k would give us an infinite number of optimal solution among which there are two optimal basic feasible solutions?

Start with slack variables as basic variables

Note: if you start with $k=1$ you do not need to redo all calculations for the case $k=2$

② Consider

$$\begin{aligned} \text{(LP)} \quad & \min \quad 6x_1 + 2x_2 + 3x_3 \\ & \text{s.t.} \quad x_1 + 2x_2 - x_3 \geq 5 \\ & \quad \quad x_1 - x_2 + 2x_3 \geq 2 \\ & \quad \quad x_j \geq 0 \quad j=1,2,3 \end{aligned}$$

- Rewrite (LP) on standard form
- Note that the slack variables as basic variables does not give a basic feasible solution. Solve a (phase-1) problem to find an initial basic feasible solution.
- Using the b.f.s found in b) as initial b.f.s., solve (LP) using the Simplex method.