Lesson 23. The Simplex Method – Example

Problem 1. Consider the following LP:

$$\begin{aligned}
\text{maximize} \quad & 4x_1 + 3x_2 + 5x_3 \\
\text{subject to} \quad & 2x_1 - x_2 + 4x_3 \le 18 \\
& 4x_1 + 2x_2 + 5x_3 \le 10 \\
& x_1, x_2, x_3 \ge 0
\end{aligned}$$

a. Construct the canonical form of this LP.

b. Use the simplex method to solve the canonical form LP you wrote in part a. In particular:

- Construct your initial BFS and basis by making the nonslack variables having value 0.

- Choose your entering variable using **Dantzig's rule** – that is, choose the improving simplex direction with the most positive reduced cost. (If this was a minimization LP, you would choose the improving simplex direction with the most negative reduced cost.)

c. What is the optimal <u>value</u> of the canonical form LP you wrote in part a? Give an optimal solution.

d. What is the optimal <u>value</u> of the original LP above? Give an optimal solution.