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Optimization

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Exercises 3

1. (PORTA – Polyhedron Representation Transformation Algorithm)

Install the PORTA package and read the manpages (http://typo.zib.de/opt-long_projects/Software/Porta/).

Given the following ILP:

$$\begin{array}{ll} \max & x_1 + x_2 + x_3 + x_4 \\ \text{w.r.t.} & \\ & x_1 + x_2 + x_3 \leq 2 \\ & x_1 + x_2 + x_4 \leq 2 \\ & x_3 + x_4 \leq 1 \end{array}$$

$$x_1, x_2, x_3, x_4 \text{ integral}$$

- Solve the LP relaxation with a solver (e.g lp-solve or our Clp demo program).
- Generate all feasible integral points using program *vint* (PORTA package).
- Transform the point representation into the halfspace representation using program *traf* (PORTA package).
- Solve the resulting linear program again with your lp solver.

2. Branch and Bound

$$\begin{array}{ll} \max & 8x_1 + 11x_2 + 6x_3 + 4x_4 \\ \text{w.r.t.} & \\ & 5x_1 + 7x_2 + 4x_3 + 3x_4 \leq 14 \\ & x_1, x_2, x_3, x_4 \in \{0, 1\} \end{array}$$

- Solve the LP relaxation with a solver.
- Apply branch and bound to find the optimal solution to the ILP.