Branch and Bound Solvers

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Problem 1

- If the LP relaxation at the "root" of the branch and bound is infeasible, the whole ILP must be infeasible.
- Each step of branch and bound solves the LP relaxation of some ILP problem that is either the original problem or obtained by branching.
- If the original ILP is unbounded, then the LP relaxation at the root of branch and bound (the very first LP we will solve) will be unbounded.

Problem 2

- We may recursively solve two subproblems with the constraints $x_1 \leq 2$ and $x_1 \geq 3$, respectively.
- We recursively solve two subproblems with the constraints $x_4 \leq 6$ and $x_4 \geq 7$, respectively.

Problem 3

- Suppose we solve an LP relaxation and find that the objective value is 8.5, we can prune this branch from further consideration.
- Suppose we solve an LP relaxation and find that the objective value is 9.8, we can prune this branch from further consideration.
- The optimal solution of the ILP will have objective value greater than or equal to 9.