Lecture 21: Outline

- Integer Programming (IP) terminology.
- IP formulations.
- Comparing IP formulations.
Integer Programming terminology

\[ \begin{align*}
\text{min} & \quad c'x + d'y & \quad \text{(Mixed IP)} \\
\text{s.t.} & \quad Ax + By = b \\
& \quad x, y \geq 0 \\
& \quad x : \text{integer}
\end{align*} \]

Assume entries of matrices and vectors are integers.

1. If no continuous variable \((y)\) then \text{IP}.
2. If all variables zero-one then \text{ZOIP}.

Modeling Techniques

- Binary choice.
- Forcing constraints.
- Disjunctive constraints.
- Restrictive range of values.
- Piecewise linear cost functions.
Comparing formulations

Consider an IP problem and formulations $A$ and $B$ for that problem.

Let $\mathcal{P}_A$ and $\mathcal{P}_B$ denote the feasible sets of the LP relaxations of $A$ and $B$, respectively.

**Definition**

We say $A$ is at least as strong as $B$ if $\mathcal{P}_A \subseteq \mathcal{P}_B$. 