Teaching the Simplex Method

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Geometry of Linear Programs

Simple Example

$$
\begin{aligned}
\max\ & 3x + 2y \\
\text{s.t. } & 3x + y \leq 13.5 && (1) \\
& x + 3y \leq 10.5 && (2) \\
& x, y \geq 0 && (3)
\end{aligned}
$$

Geometric Observations

- Inequalities (1)–(3) correspond to half-planes (half-spaces in higher dimensions)

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- They define the feasible region
- The objective function corresponds to an "improvement vector"
- If there is an optimal point, then there is an optimal corner point