

Teaching the Simplex Method

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Geometry of Linear Programs

Simple Example

$$\begin{array}{ll}\max & 3x + 2y \\ \text{s.t.} & 3x + y \leq 13.5\end{array}\tag{1}$$

$$x + 3y \leq 10.5\tag{2}$$

$$x, y \geq 0\tag{3}$$

Geometric Observations

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



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