

Linear programming:

Mathematical description:

Problem formulation

$$\text{Max } z = x_1 + 3x_2$$

$$\begin{cases} -x_1 + x_2 \leq 1 \\ x_1 + x_2 \leq 2 \\ x_1, x_2 \geq 0 \end{cases}$$

By default: $x_1, x_2 \in \mathbb{R}$

Indices

1, 2 (e.g., in x_1, x_2)

Constants

-1, 0, 1, 2, 3 (e.g., in $1x_1 + 3x_2, 1x_1 + 1x_2 \leq 2$)

Variables

x_1, x_2

Goal function (objective)

$$z = x_1 + 3x_2$$

Constraint

E.g., $-x_1 + x_2 \leq 1$

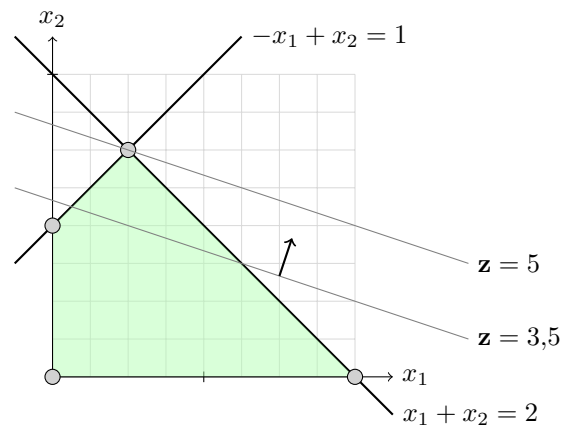
Feasible solution

E.g., $\mathbf{x} = [1, \frac{1}{2}]$, tj. $\begin{cases} x_1 = 1 \\ x_2 = \frac{1}{2} \end{cases}$

Optimal solution

$\mathbf{x}^{\text{opt}} = [\frac{1}{2}, 1\frac{1}{2}]$

Graphical solution



● extreme point
(vertex of a simplex)