OPTIMIZATION

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2 Problem

Maximize $Z = x + y$ subject to $x - y \leq -1, -x + y \leq 0, x, y \geq 0$

3 Solution

Consider,

Parameter	Value
$\mathbf{c}$	$\begin{pmatrix} 1 \\ 1 \end{pmatrix}$
$\mathbf{x}$	$\begin{pmatrix} x \\ y \end{pmatrix}$
$\mathbf{p}$	$\begin{pmatrix} 1 & -1 \\ -1 & 0 \\ 0 & -1 \\ -1 & 0 \end{pmatrix}$

Objective function:

$$\mathbf{z} = \max_{x} \mathbf{c}^T \mathbf{x} \tag{1}$$

Constraints:

$$x - y \leq -1 \tag{2}$$

$$-x + y \leq 0 \tag{3}$$
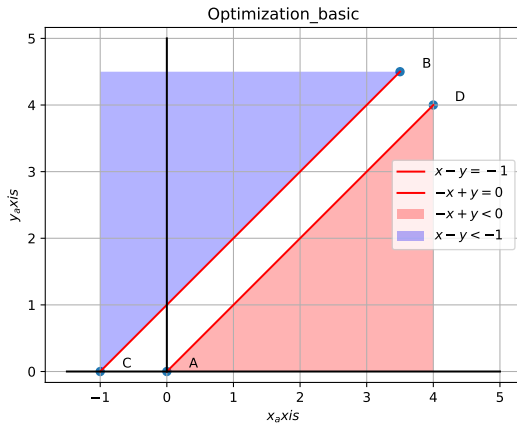
$$-x \leq 0 \tag{4}$$

$$-y \leq 0 \tag{5}$$

writing all the constraints in matrix form:

$$\mathbf{p^T x} \preceq \mathbf{q} \tag{6}$$

$$\begin{pmatrix} 1 & -1 \\ -1 & 0 \\ 0 & -1 \\ -1 & 0 \end{pmatrix} x \preceq \begin{pmatrix} -1 \\ 0 \\ 0 \\ 0 \end{pmatrix} \tag{7}$$

By providing the objective function and constraints to cvxpy, we get the optimal solution for z
cvxpy code

from cvxpy code,
There is no feasible region between,
Hence there is no maximum value for z.