Linear Programming

1 12^{th} Maths - Chapter 12

This is Problem-1 from Exercise 12.1

1. Maximize

$$Z = 3x + 4y \tag{1}$$

subject to the constraints:

$$x + 4y \leq 4, \tag{2}$$
$$x \geq 0, y \geq 0 \tag{3}$$

Solution: The given problem can be formulated as

$$\max_{\mathbf{x}} Z = \begin{pmatrix} 3 & 4 \end{pmatrix} \mathbf{x} \tag{4}$$
$$\begin{pmatrix} 1 & 4 \\ -1 & 0 \\ 0 & -1 \end{pmatrix} \mathbf{x} \preceq \begin{pmatrix} 4 \\ 0 \\ 0 \end{pmatrix} \tag{5}$$

Solving using cvxpy, we get

$$\max_{\mathbf{x}} Z = 12 \tag{6}$$
$$\mathbf{x} = \begin{pmatrix} 4 \\ 0 \end{pmatrix} \tag{7}$$

The figure is as shown in Fig1

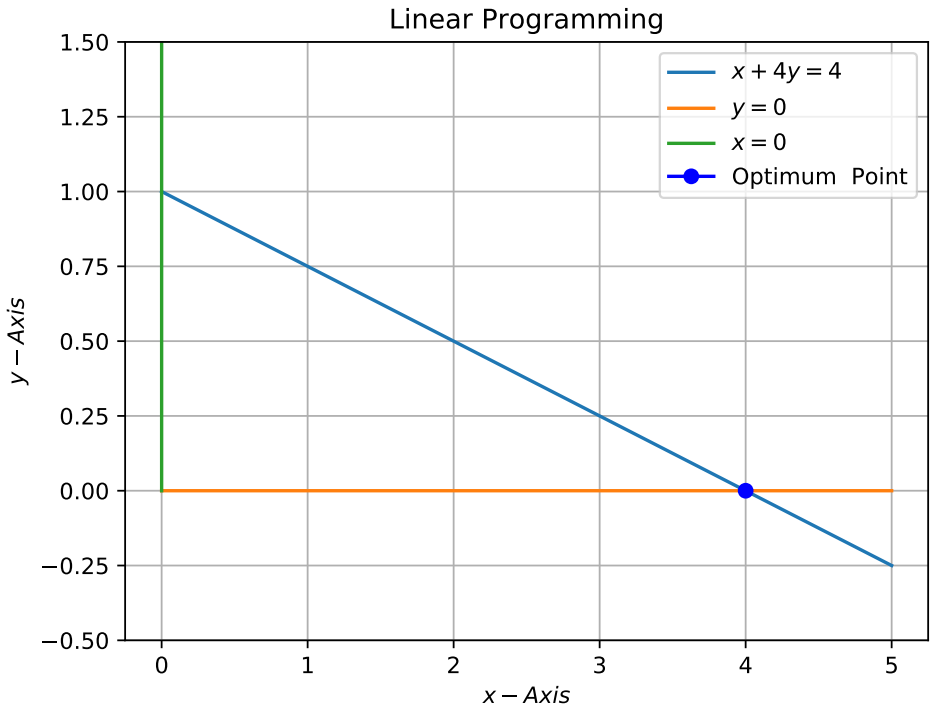
Linear Programming
$x + 4y = 4$
$y = 0$
$x = 0$
Optimum Point
1.50
1.25
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
0
1
2
3
4
5
$y - Axis$
$x - Axis$

Figure 1