Step-1

Let us consider the following Linear Programming Problem

Minimize: $2x_1 + x_2$

Subject to following constraints

$x_1 + x_2 \geq 4$
$x_1 + 3x_2 \geq 12$
$x_1 - x_2 \geq 0$
$x \geq 0$

Step-2

Let us solve the problem by graphical method.

Convert the inequality into equations.

$x_1 + x_2 = 4$

$\dfrac{x_1}{4} + \dfrac{x_2}{4} = 1$

And

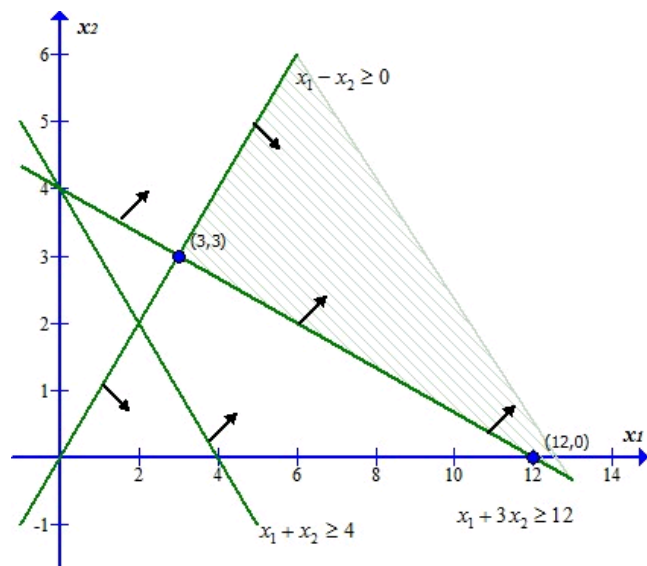$x_1 + 3x_2 = 12$

$\dfrac{x_1}{12} + \dfrac{x_2}{4} = 1$

And

$x_1 - x_2 = 0$
$x_1 = x_2$

Step-3

Let us plot the equations on the co-ordinate axes and mark the region according to inequality.

Step-4

From the graph, the corner points of feasible regions are $(3,3)$ and $(12,0)$

Let us find the value of the function at corner points

$$C_{(3,3)} = 2(3)+3$$
$$= 9$$

And

$$C_{(12,0)} = 2(12)+0$$
$$= 24$$

Thus, the minimum value is 9 at $(3,3)$