

Step-1

Let us consider the following linear programming problem

Minimize: $x_1 + x_2$

Subject to following constraints

$$x_1 \geq 0$$

$$x_2 \geq 0$$

$$2x_1 \geq 4$$

$$x_1 + 3x_2 \geq 11$$

Step-2

Let us find the dual of the LPP problem by introducing the dual unknown y_1 and y_2 .

Minimization in the Primal becomes maximization in the dual.

Thus, the dual of the problem is as follows.

Maximize: $4y_1 + 11y_2$

Subject to following constraints

$$y_1 \geq 0$$

$$y_2 \geq 0$$

$$2y_1 + y_2 \leq 1$$

$$3y_2 \leq 1$$

Step-3

Let us solve the primal problem by converting the inequality into equations.

$$2x_1 = 4$$

$$x_1 + 3x_2 = 11$$

It gives, $x_1 = 2$ and $x_2 = 3$

And the maximum cost is $\boxed{c_1 = 5}$

Step-4

Let us solve the dual problem by converting the inequality into equations.

$$2y_1^* + y_2^* = 1$$

$$3y_2^* = 1$$

It gives, $y_1^* = \frac{1}{3}$ and $y_2^* = \frac{1}{3}$

And the minimum cost is $\boxed{c_2 = 5}$

Step-5

Therefore, it is observed that the primal and the corresponding dual have the same solution.