

Step-1

Let us consider the linear programming problem with A as the identity matrix and the vectors b and c are nonnegative.

Therefore, we can write the primal of the problem as follows.

Minimize: cx

Subject to $x \leq b$

And the corresponding dual of the problem is as follows.

Maximize: by

Subject to $y \leq c$

Step-2

Solving the primal and the dual of the problem, we get the following results.

$$x^* = b$$

$$y^* = c$$

Therefore, the corresponding cost of primal and its dual is bc

Step-3

Now, according to the property, if the vectors x and y are feasible and $cx = yb$, then x and y are optimal.

Step-4

Now, if the first component of b is negative, then the optimal value of x and y are changed as shown below

$$\begin{array}{l} x^* = (0, b_2, \dots, b_n) \\ y^* = (0, c_2, \dots, c_n) \end{array}$$