Step-1

Consider the following linear programming problem

Minimize: $3x+y$

Subject to

$x+2y \geq 6$
$2x+y \geq 6$

Step-2

Now, consider the problem with four unknown (x, y, and two slack variables)

Therefore, we get the following vectors.

$$A=\begin{bmatrix}1 & 2 & -1 & 0\\ 2 & 1 & 0 & -1\end{bmatrix}$$

$$b=\begin{bmatrix}6\\ 6\end{bmatrix}$$

$$c=\begin{bmatrix}3 & 1 & 0 & 0\end{bmatrix}$$

Step-3

Thus, the original cost and the constraints gives

$$\begin{bmatrix}A & b\\ c & 0\end{bmatrix}=\begin{bmatrix}1 & 2 & -1 & 0 & 6\\ 2 & 1 & 0 & -1 & 6\\ 3 & 1 & 0 & 0 & 0\end{bmatrix}$$

Now, we exchange column 1 and 3 to put basic variable before free variables.

Tableau at point P is shown below

$$T=\begin{bmatrix}-1 & 2 & 1 & 0 & 6\\ 0 & 1 & 2 & -1 & 6\\ 0 & 1 & 3 & 0 & 0\end{bmatrix}$$

Perform the row transformation to get a fully reduced from

Perform multiplication of first row with 1, to give a unit pivot and use the second row to produce zeros in the second column as shown below

$$R = \begin{bmatrix} 1 & 0 & 3 & -2 & 6 \\ 0 & 1 & 2 & -1 & 6 \\ 0 & 0 & 1 & 1 & -6 \end{bmatrix}$$

Step-4

Now, consider $r = [1 \quad 1]$ at the bottom row.

It is observed that it has all positive entries. Therefore, the stopping test is passed.

Thus, point *P* is optimum. And the optimum cost is 6