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

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

Step-4

Now, consider $\boldsymbol{r}=[\mathbf{1} \quad \mathbf{1}]$ 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