⇒ Two Phase Method

In the first phase method the sum of the artificial variables is minimized subject to the given constants (known as auxilary LPP) Prove that a basic feasible solution to the original LPP.

Second Phase then obtimize the original Objective function starting with the basic feasible solution obtained at the and of phase first.

Min z = Sum of artificial variable = $A_1 + A_2$

Max $z^* = -A_1 - A_2$.

Step 1 Wright the given LPP into its standard form and check whether there exist a starting basic feasible solution.

a If there is a ready starting basic feasible solⁿ go to Step - II.

b. If there does not exist a ready starting basic feasible solⁿ go on to the next step.

Phase - I

Step 2. Add the artificial variable to the left side of the each eqⁿ that the needed starting basic variable.

$$Max\ z = -A_1 - A_2 - \cdots - A_n$$

Step 3 Apply Simplex Algorithm to the specially constructed LPP. The following three cases they arises :

a. If $Max\ z^* < 0$ and atleast one artificial variable is present in the basis with positive value. In ~~such a way~~ this case the given LPP has no feasible solution.

b. If $Max\ z^* = 0$ and atleast one artificial variable is present in the basis at 0 value. In such a case the given LPP possess the feasible solution.
In order to that basic feasible solution we may proceed directly to a phase second
OR
Else eliminate the artificial basic variable and then procedd to second.

c. If $Max\ z^* = 0$ and no artificial variable is present in the basis. In such a case a basic feasible solution to the given LPP has been found, or go to phase II.

Phase - II

Consider the optimum basic feasible solution of phase I as a starting basic feasible solution for the given LPP.

Assign actual coefficient to the variable in the objective function and a value 0 to the artificial variable that appear at 0 value in the final simplex table of phase-I.

Apply common simplex algorithm to modified simplex table to get the optimum sol^n of the given LPP.

Ques Use two phase simplex method to

Max $z = 5x_1 + 3x_2$

s.t

$2x_1 + x_2 \leq 1$

$x_1 + 4x_2 \geq 6$

$x_1, x_2 \geq 6$

Max $z^* = -A_1$

$2x_1 + x_2 + x_3 = 1$

$x_1 + 4x_2 - x_4 + x_5 = 6$

			0	0	0	0	-1	
B	C_B	x_B	y_1	y_2	y_3	y_4	y_5	Min ratio
y_3	0	1	2	1	1	0	0	1/1
y_5	-1	6	1	4	0	-1	1	6/4 = 3/2
		z = -6	-1	-4 ↑	0	1	0	

y_2	0	1	2	1	1	0	0
y_5	-1	2	-7	0	-4	-1	1
		z = -2	7	0	4	1	0

Since, all $z_j - c_j \geq 0$ but Max $z^* < 0$ and an artificial variable is in the basis at a +ve level. Therefore, the given LPP does not possess any feasible solⁿ.