

## Step-1

Let us consider the problem in which we need to maximize the cost instead of minimization.

It gives,  $\mathbf{Ax} = \mathbf{b}$  and  $\mathbf{x} \leq \mathbf{0}$

The stopping condition in this case will be the reverse of the stopping condition in minimization.

Thus, the stopping condition would be  $\boxed{\mathbf{r} \leq \mathbf{0}}$ .

## Step-2

Now, if this condition fails, and the  $i^{\text{th}}$  component is the largest, then that column of  $N$  will enter the basis.

Suppose  $\mathbf{x}_i$  is the entering variable and  $u$  is column  $I$  of  $N$ .

$$\mathbf{x}_i = \text{smallest ratio} \frac{(\mathbf{B}^{-1}\mathbf{b})_j}{(\mathbf{B}^{-1}\mathbf{u})_j} = \frac{(\mathbf{B}^{-1}\mathbf{b})_k}{(\mathbf{B}^{-1}\mathbf{u})_k}$$

At new corner:

Therefore, the  $k^{\text{th}}$  column of the old  $B$  leaves the basis and the new column  $u$  enters.