

## Step-1

If  $r = (\text{rank of } C(A))$  the number of non zero columns of  $A$ ,  $A$  be an  $m$  by  $n$  matrix

(a) the non homogenous system  $Ax = b$  has number of solutions either 0 or 1 depending on the column  $b$  if  $r < m$  or  $r = m$

## Step-2

(b) The number of solutions is infinite without considering the column  $b$  if  $r = m, r < n$

## Step-3

(c) The number of solutions is either 0 or infinite by considering the column  $b$ ,  $r < m$  or  $(r = m \text{ such that } r < n)$

## Step-4

(d) the number of solutions of  $Ax = b$  is unique without considering the column  $b$  if  $r = m = n$