Convex Optimization

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FEB 28,2019

Q:31

The cost matrix of a transportation problem is given by

1	2	3	4
4	3	2	0
0	2	2	1

The following are the values of variables in a feasible solution
$x_{12} = 6, x_{23} = 2, x_{24} = 6, x_{31} = 4, x_{33} = 6$
Then which of the following is correct??
(A) The solution is degenerate and basic
(B) The solution is non-degenerate and basic
(C) The solution is degenerate and non-basic
(D) The solution is non-degenerate and non- basic

Solution:

Basic feasible solution: A feasible solution to a transportation problem is said to be a basic feasible solution if it contains no more than m + n – 1 non – negative allocations, where m is the number of rows and n is the number of columns of the transportation problem.

Non -degenerate basic feasible solution: A basic feasible solution to a (m x n) transportation problem is said to be non-degenerate if,

1. The total number of non-negative allocations is exactly m+n–1
2. These m + n – 1 allocations are in independent positions.

Degenerate basic feasible solution: A basic feasible solution in which the total number of non-negative allocations is less than m + n – 1 is called degenerate basic feasible solution.

So,

There are five allocations given

$x_{12} = 6, x_{23} = 2, x_{24} = 6, x_{31} = 4, x_{33} = 6$

All the five allocations are positive so,

m+n-1 , m = no of rows , n = no of columns

m+n-1 = 3+4-1 = 6

1	2⑥	3	4
4	3	2②	0⑥
0④	2	2⑥	1

Number of non-negative allocations <m+n-1 so, feasible solution is **basic** and **Degenerate**.