Travelling Salesman Problem.

→ There are a number of cities a salesman must visit. ex: A, B, C & D

→ The distance / time / cost between every pair of cities is given.

→ The Salesman starts from his home city, he must visit every city exactly once and returns to his home city

→ The problem is to find the route shortest distance / time / cost

Phase I

→ TSP can be first solved as AP by using HM to find optimum solution.

→ Then Check the TSP condition.

→ If the condition is satisfied, then the AP solution will be the optimum solution even for TSP.

If not, go to Phase II

I The solution can be adjusted by inspection

II Form a single circuit

III The Iterative Procedure
— Branch and bound method.

① A travelling salesman has planned to visit 4 cities. He would like to start from a particular city, visit each city only once and return to the starting city. The travelling cost in rupees is given in the table below. Find the least-cost route.

To city

From city	A	B	C	D
A	0	25	75	45
B	35	0	150	25
C	35	40	0	15
D	65	75	130	0

	A	B	C	D
A	∞			
B		∞		
C			∞	
D				∞

	A	B	C	D
A	∞	25	75	45
B	35	∞	150	25
C	35	40	∞	15
D	65	75	130	∞

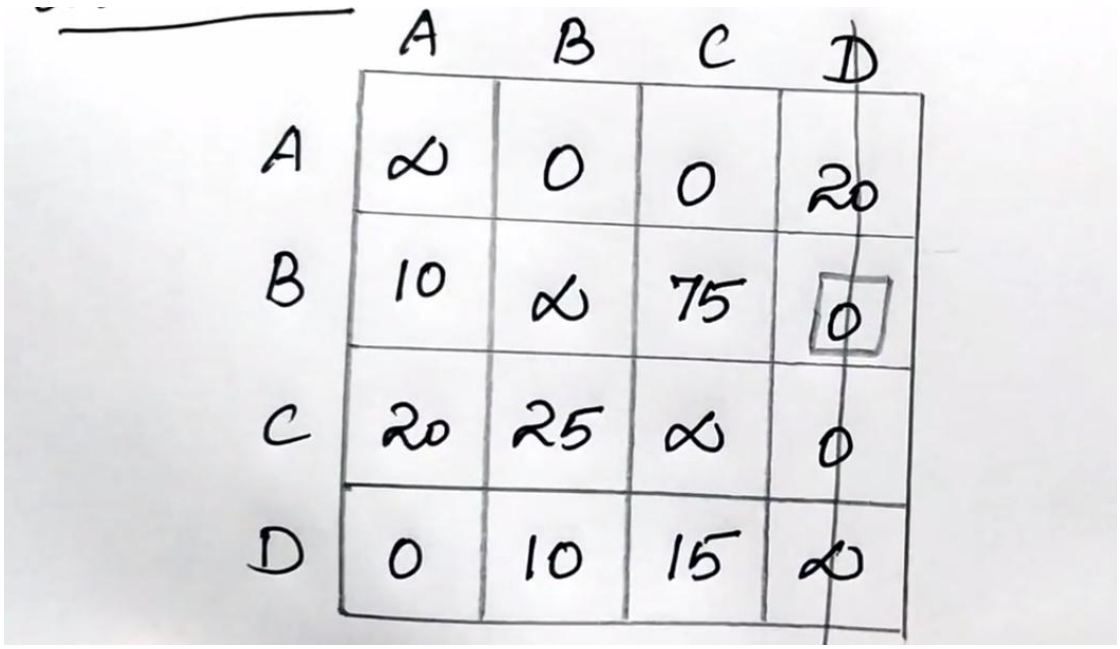
Row Reduction

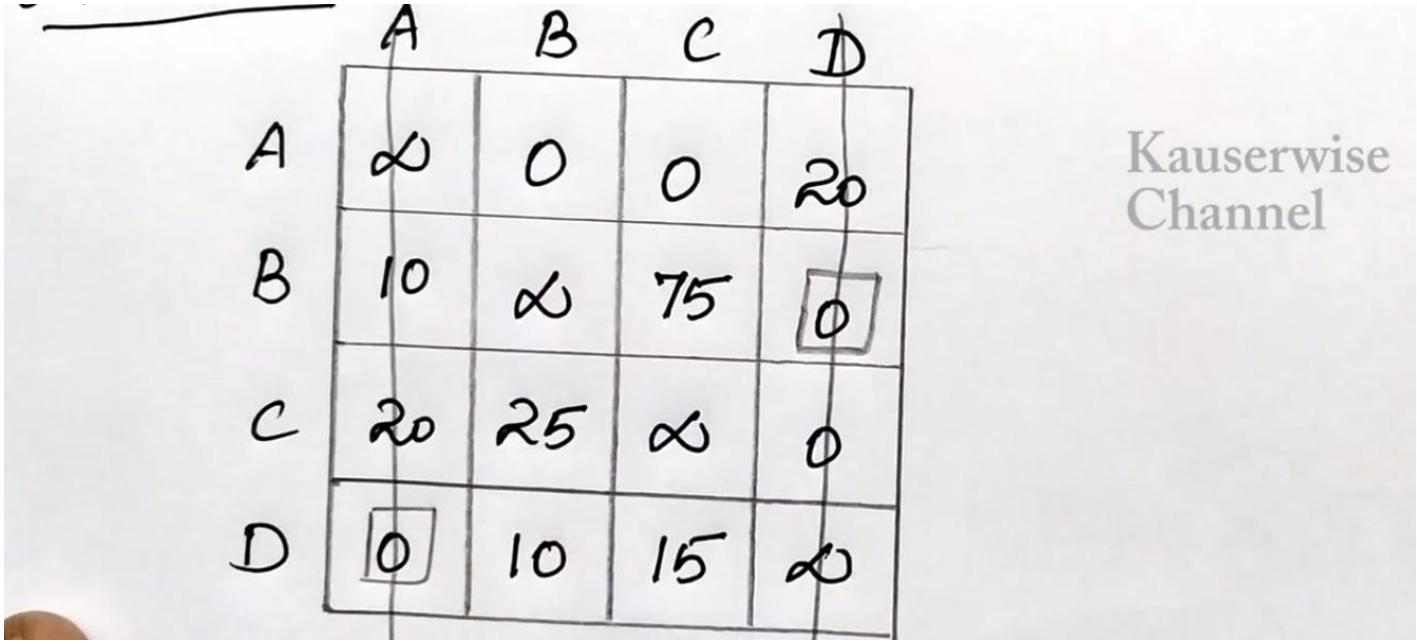
	A	B	C	D
A	∞	0	50	20
B	10	∞	125	0
C	20	25	∞	0
D	0	10	65	∞

Column Reduction

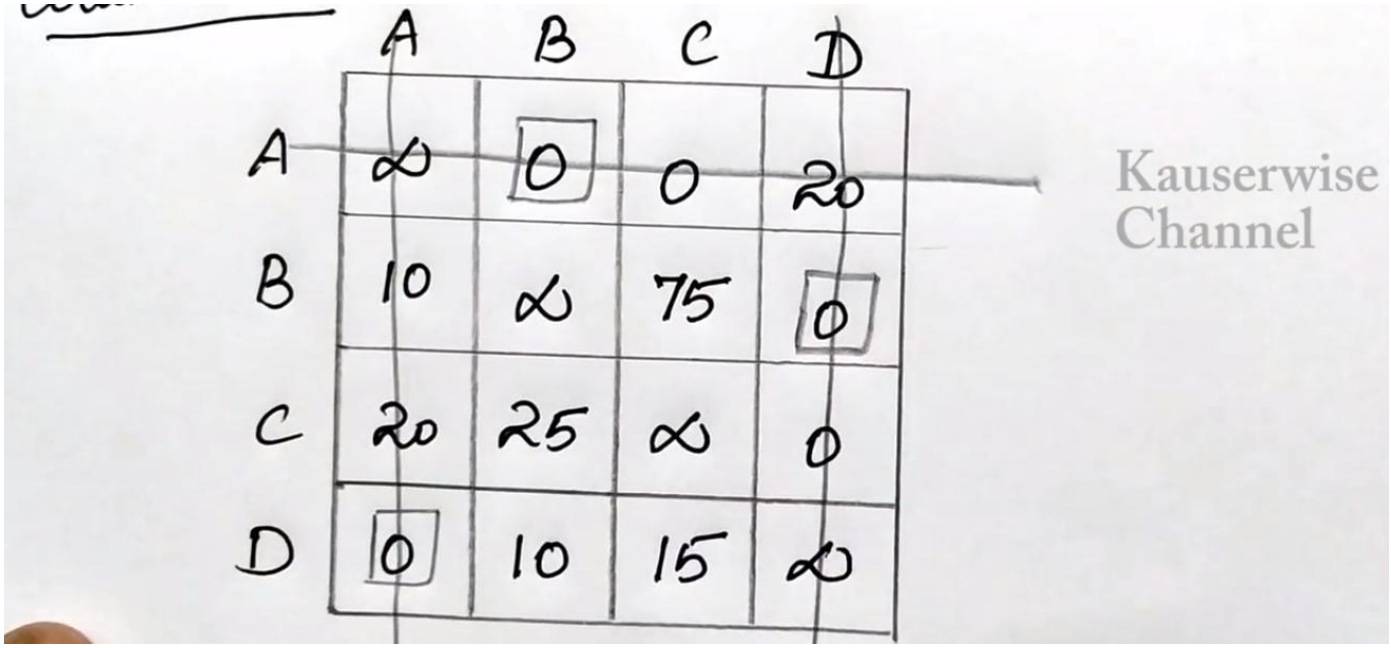
	A	B	C	D
A	∞	0	0	20
B	10	∞	75	0
C	20	25	∞	0
D	0	10	15	∞

Row scanning

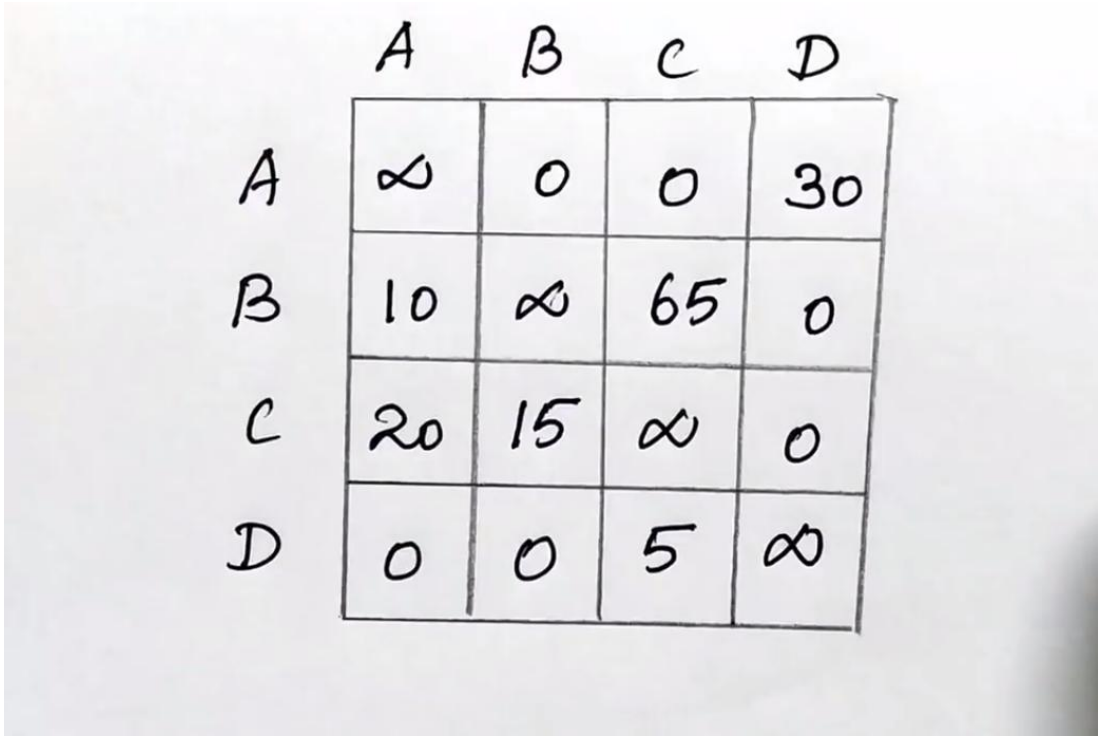




Column Scanning

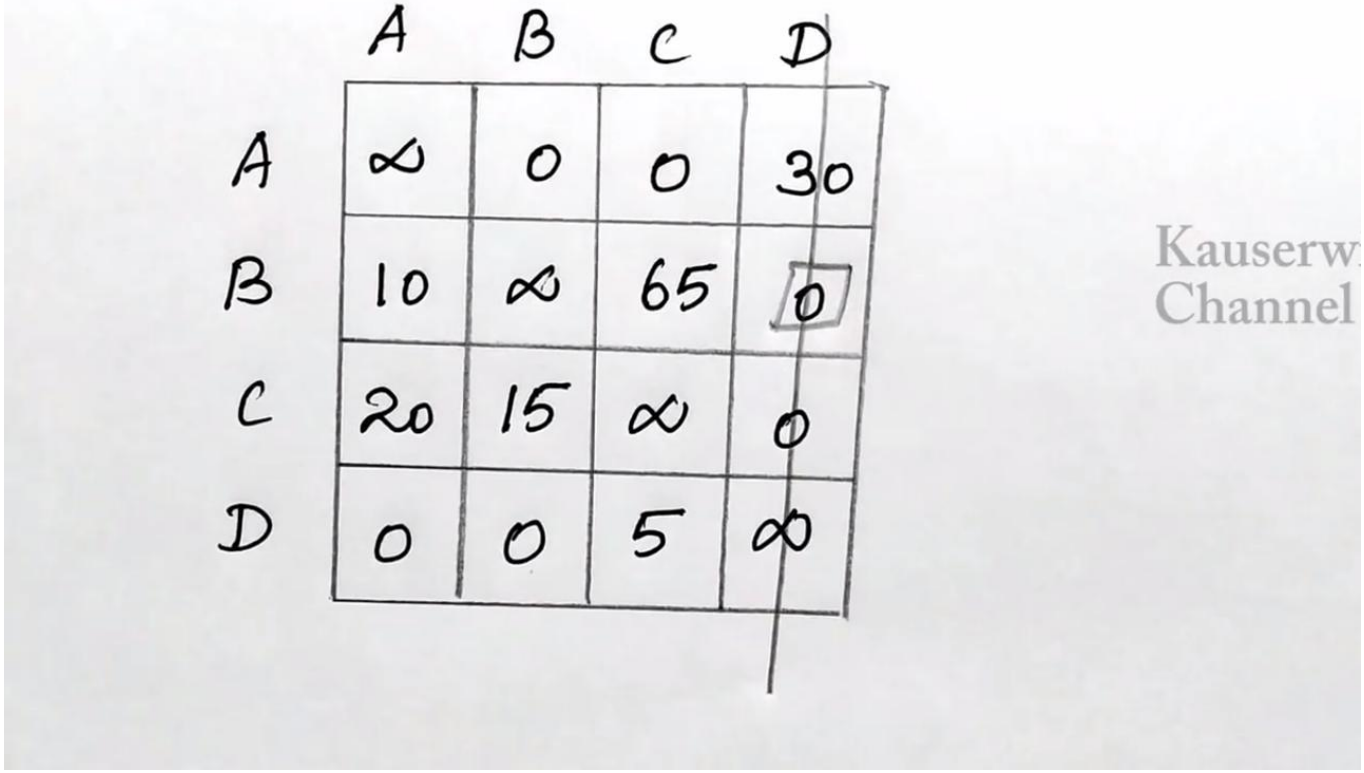


Subtracting and Adding the least number out of undeleted cells.



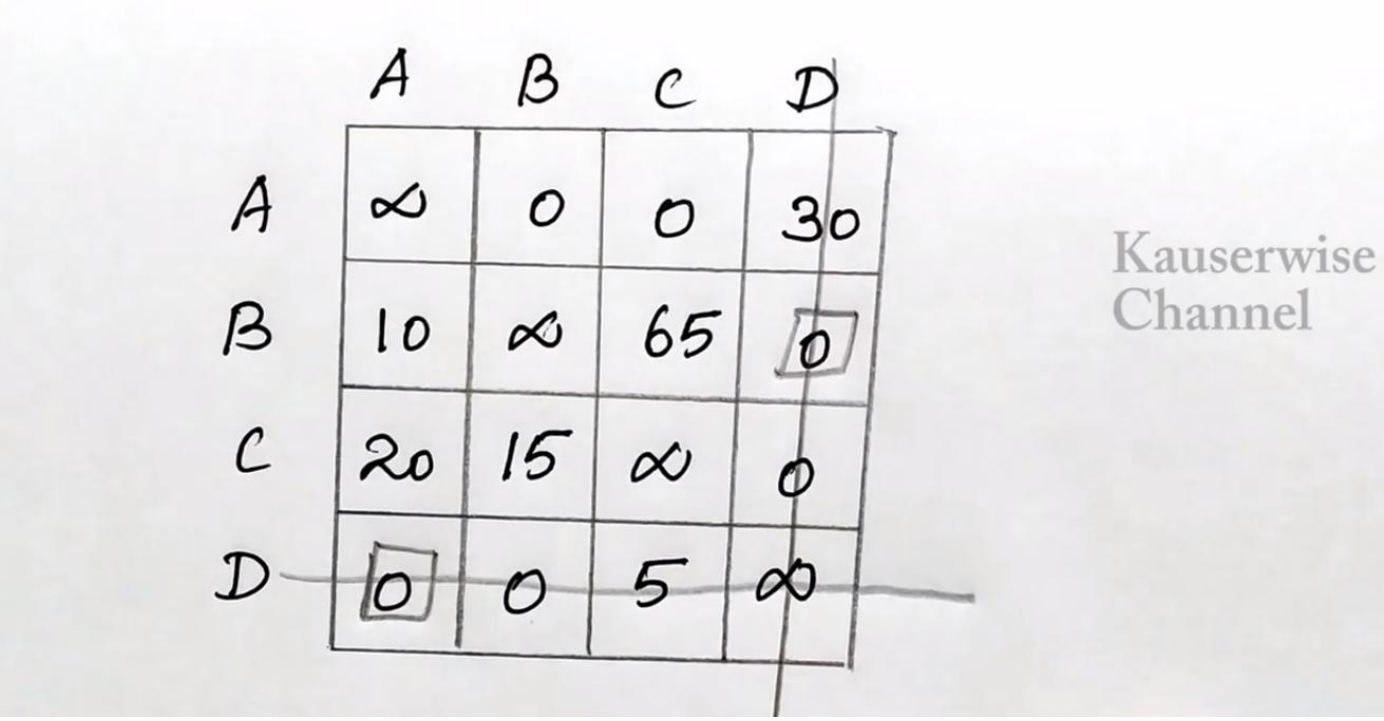
	A	B	C	D
A	∞	0	0	30
B	10	∞	65	0
C	20	15	∞	0
D	0	0	5	∞

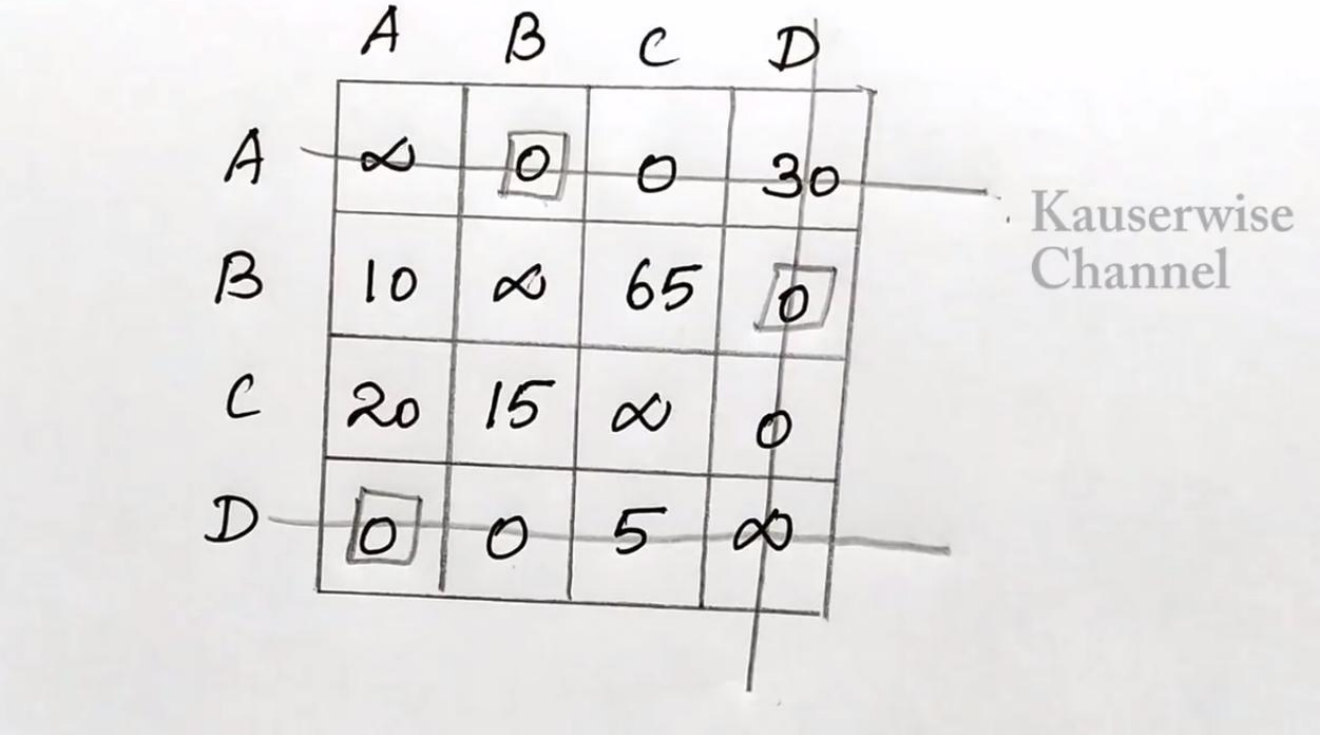
Row scanning



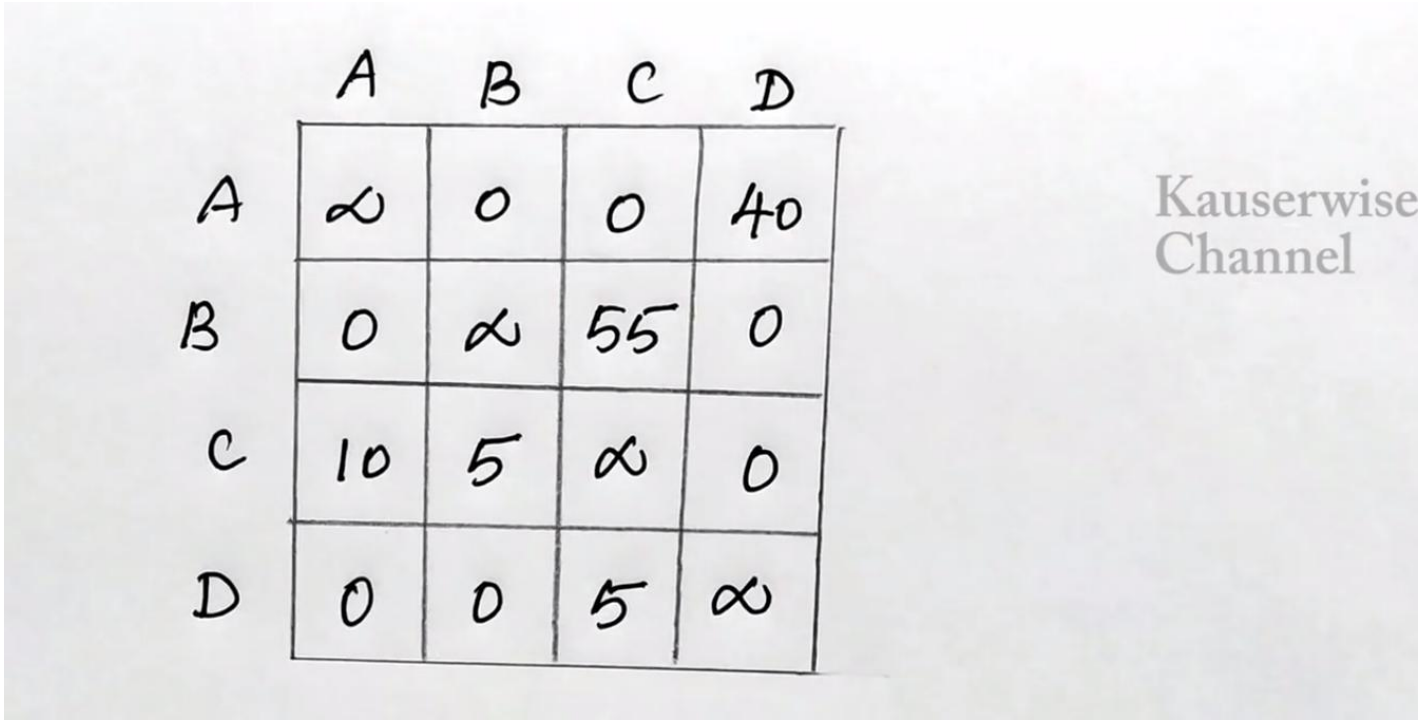
	A	B	C	D
A	∞	0	0	30
B	10	∞	65	0
C	20	15	∞	0
D	0	0	5	∞

Column Scanning

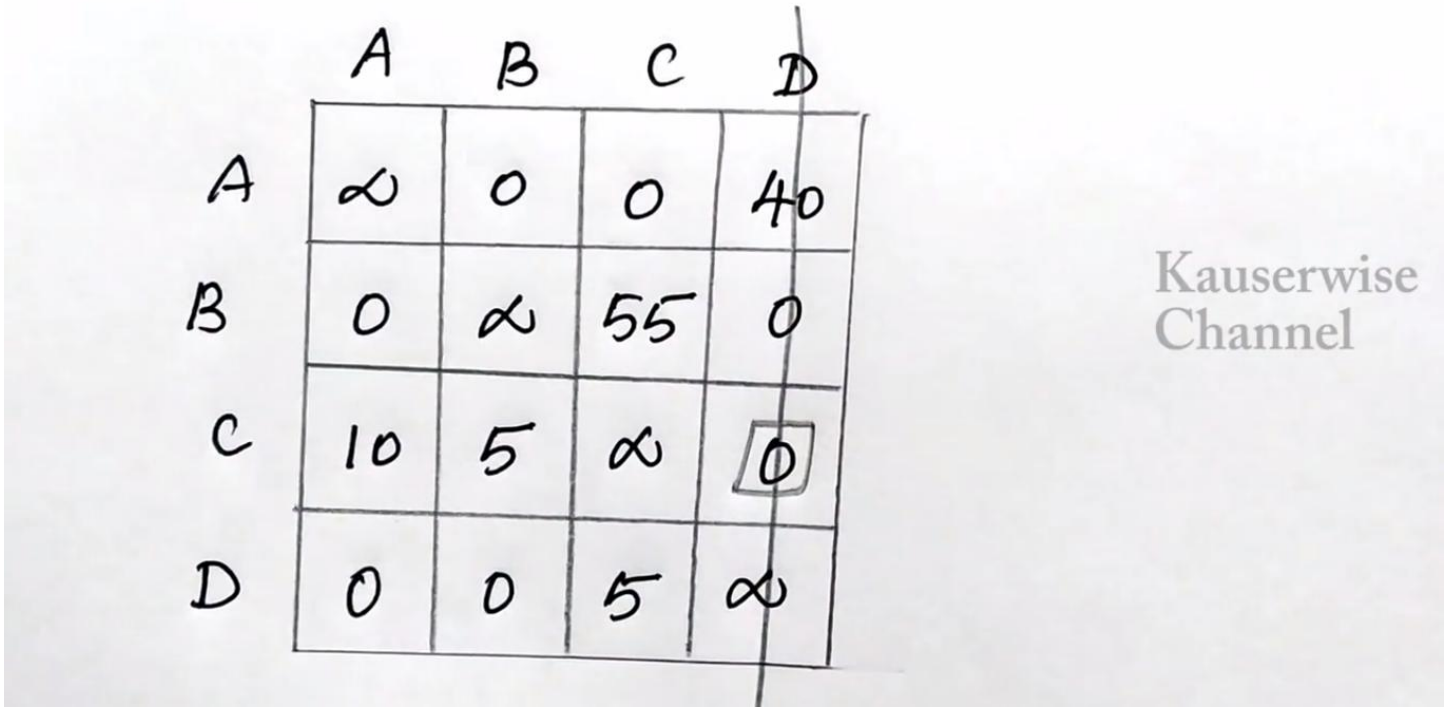




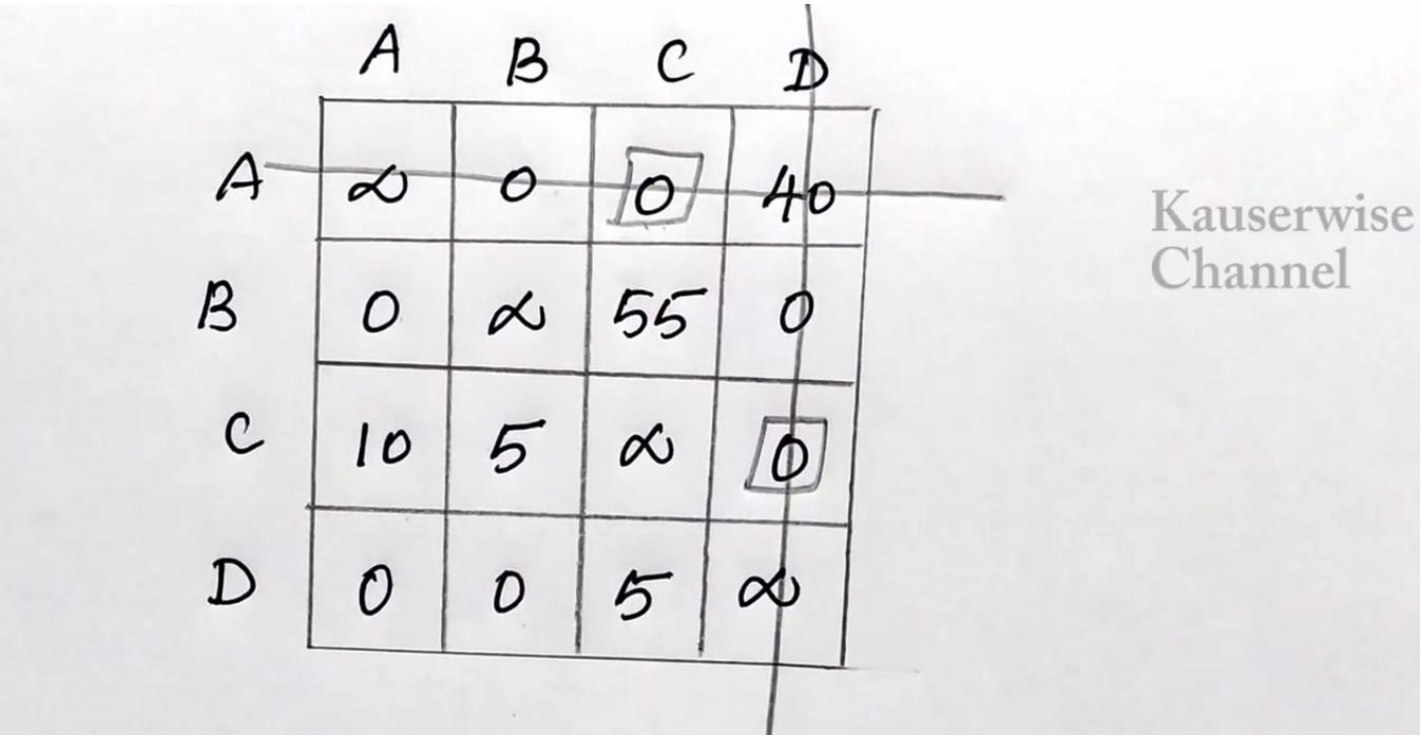
We haven’t obtained 4 assignments, so we have to repeat the same procedure of adding and subtracting least value from undeleted cells.



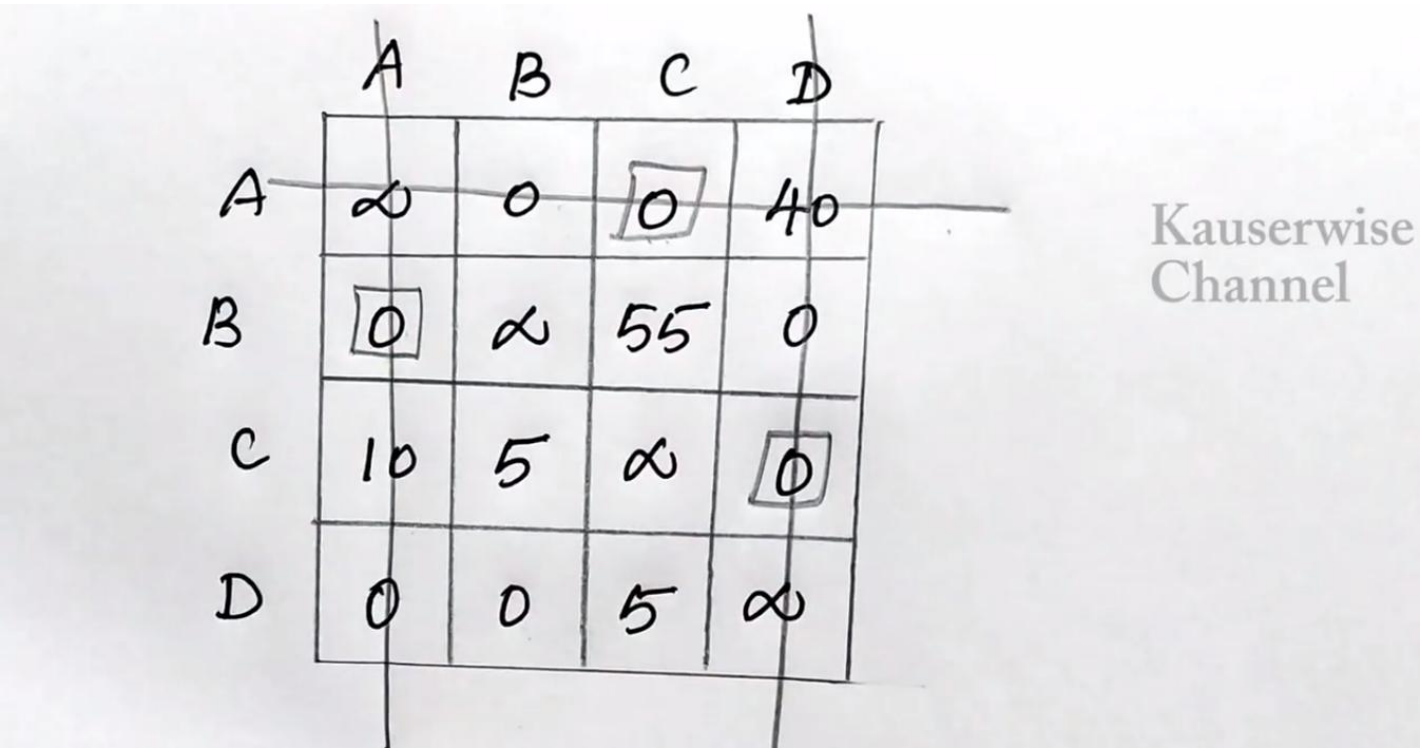
Row Scanning

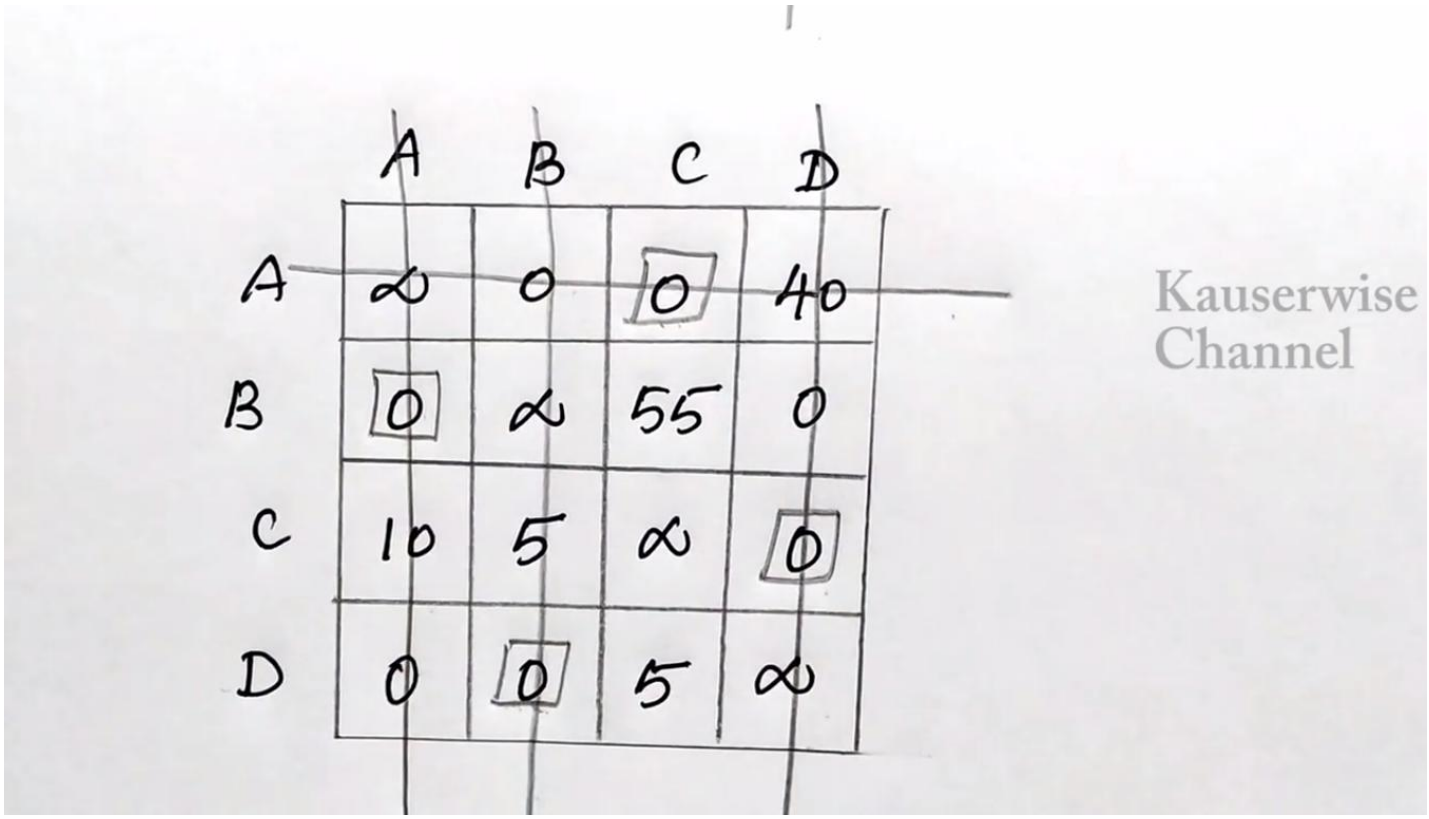


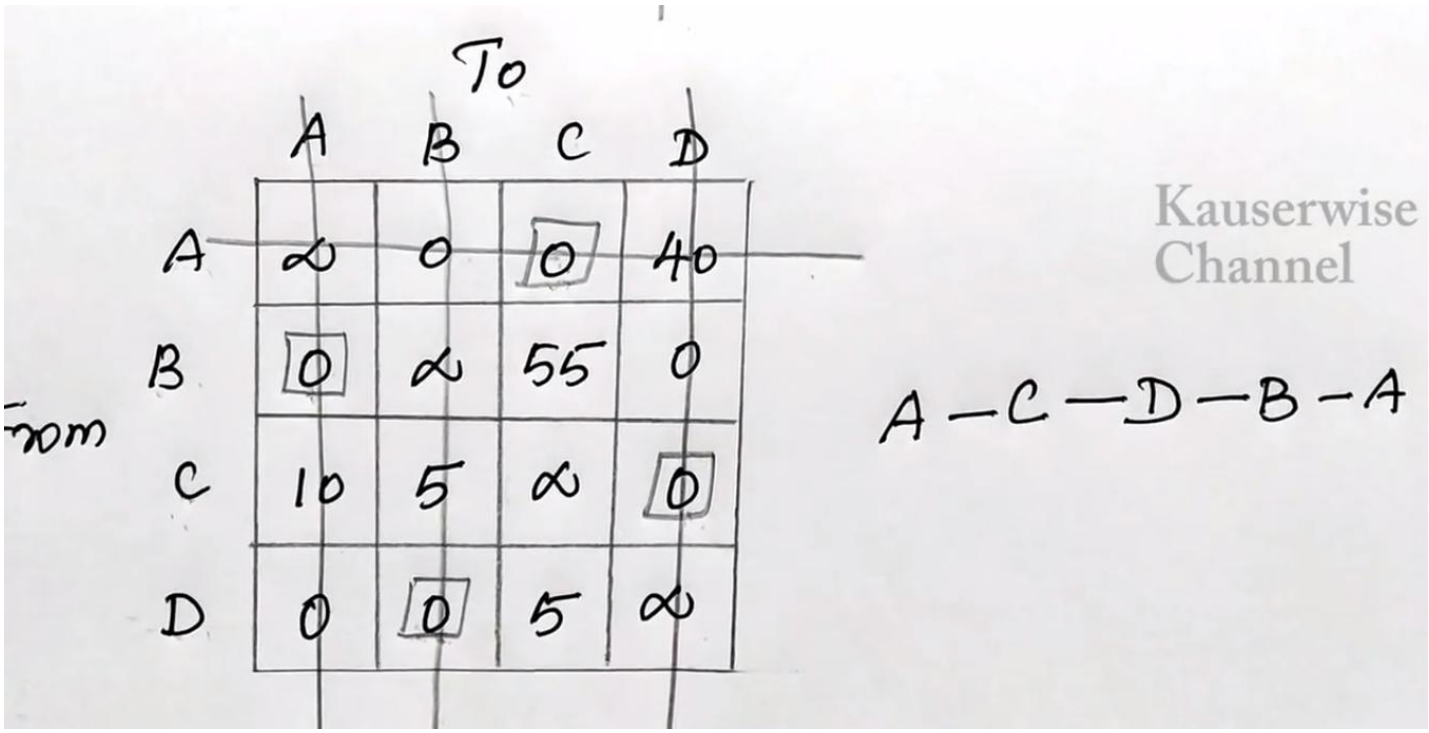
Column Scanning



Row Scanning







A – C – D – B – A

From city \ To city	A	B	C	D
A	0	25	75	45
B	35	0	150	25
C	35	40	0	15
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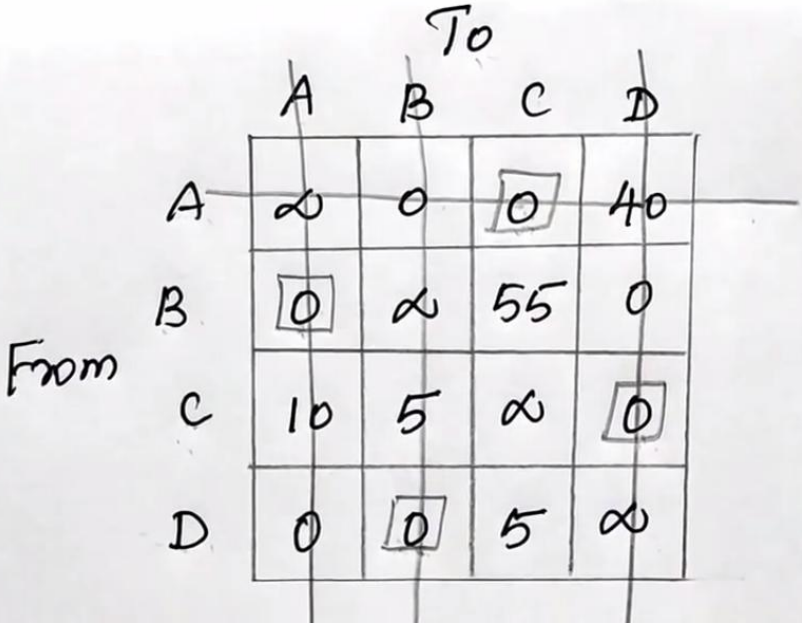

A – C – D – B – A

75 + 15 + 75 + 35

= Rs. 200 //