Travelling Salesman Problem
— Circuit method (Phase 2)

Example: Find the least cost route for the following TSP.

	A	B	C	D	E
A	∞	2	5	8	1
B	6	∞	3	9	2
C	8	7	∞	4	8
D	13	4	7	∞	5
E	1	3	2	8	∞

→ Step 1: Row reduction

∞	1	4	7	0
4	∞	1	7	0
4	3	∞	0	4
9	0	3	∞	1
0	2	1	7	∞

⇓

Column reduction

∞	1	3	7	[0]
4	∞	[0]	7	0
4	3	∞	[0]	4
9	[0]	2	∞	1
[0]	2	0	7	∞

(Row Scanning)

No of squares = 5 = No of rows

A → E, B → C, C → D, D → B, E → A

So travelling Salesman problem condition is not satisfied.

Total cost of the optimal solution from assignment problem = 1+1+3+4+4
= 13.

There are two circuits in solution.

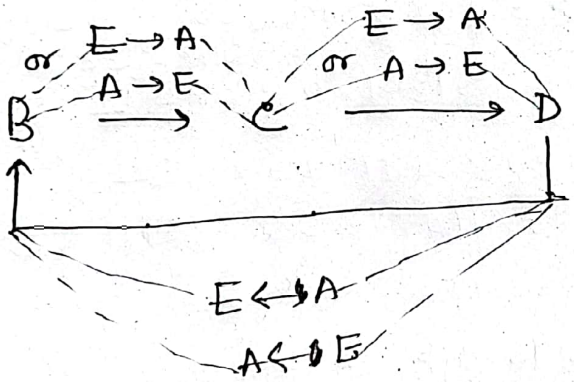
(1) A → E
↑ ___ ↓

(2) B → C → D
↑ ___ ↓

We need to form a single circuit to satisfy TSP condition.

From (1) circuit, there are two possibilitees i.e. A → E and E → A

We need to insert this into second circuit and check out the possibilities.



There are six alternative possibilities are there.

		Extra cost to form single circuit
(i) B A and E C	= 4 + 0 = 4	(cost from last Assignment table)
(ii) BE and AC	= 0 + 3 = 3	
(iii) CA and ED	= 4 + 7 = 11	
(iv) CE and AD	= 4 + 7 = 11	
(v) D A and EB	= 9 + 2 = 11	
(vi) DE and AB	= 1+ 1 = 2 → least cost	

Optimal ~~cost~~ sol^{n} : B → C → D → E → A
↑ ___ ↓

Total cost = 13 + 2 = 15