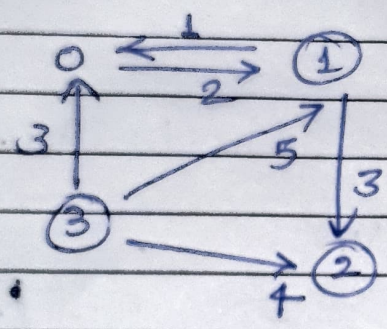


Floyd Warshall Algo :-

Call pair shortest path / Multisource shortest path algorithm :-

- Note :-
- ① We use adjacency matrix instead of adj list.
 - ② If given UG then convert it into by ~~to~~ DG by same method as explain in Bellman ford algo.

Ex = 1.



	0	1	2	3
0	0	2	∞	∞
1	1	0	3	∞
2	∞	∞	0	∞
3	3	5	4	0

for every pair of node

Algo => Go via every node / vertex and update dist. as minimum.

$$\text{dist}[i][j] = \min(\text{dist}[i][k] + \text{dist}[k][j]) \quad (\text{via } k)$$

Applying algo in Ex 1 =>

0	2	∞	∞	via 0 →	0	2	∞	∞	via 1 →
1	0	3	∞		1	0	3	∞	
∞	∞	0	∞		∞	∞	0	∞	
3	5	4	0		3	5	4	0	

$\min(\text{dist}[i][0] + \text{dist}[0][j])$

$$[0][2] \rightarrow [0][1] + [1][2] \Rightarrow 2 + 3 = 5$$

$$[0][3] \rightarrow [0][1] + [1][3] \Rightarrow 2 + \infty = \infty$$

$$[2][0] = [2][1] + [1][0] =$$

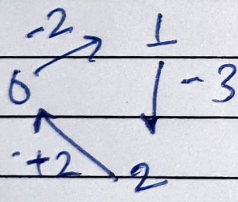
0	2	5	∞
1	0	3	∞
∞	∞	0	∞
3	5	4	0

via 2

via 3

final Matrix.

How to detect -ve cycle?



$$-2 + 2 - 3 = -3$$

cost[0][0] = -3 (after applying this algo.)

but it should be zero. Hence prove there is -ve cycle.

```
for (i = 0 → n) {
    if (cost[l][i] < 0) {
        cout << "negative cycle";
    }
}
```