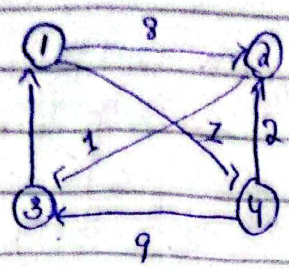
By Crate smasher,

→ All pair shortest path (Floyd warshall Algo)



First Distane Matrix is D^0

	1	2	3	4
1	0	8	∞	1
2	∞	0	1	∞
3	4	∞	0	∞
4	∞	2	9	0

D^0 means asaan Ulta Distance Matrix likhandoos, b/w two vertex, agr direct edge ahy.

if there is no direct edge then we will write infinite here

like: 1 to 2 we have direct edge to assaan Uno jo weight likhandoos. and like 1 to 3 direct edge nh hai keh jai through wangju thao pae ta po ∞.

sol → so 1 to 1 distance = 0

→ 1 to 2 direct edge is and weight is 8.

→ 1 to 3 direct edge nh hai to ∞

→ 1 to 4 direct edge exist kany thi ta Ukhe "1" → weight

→ 2 to 1 nh hai to infinite (∞)

→ 2 to 2 khuch nh hai to 0

→ 2 to 3 is 1

2 to 4 is ∞

Now

→ 3 to 1 we have 4 weight

→ 3 to 1 weight is 4.

→ 3 to 2 no direct edge here

→ 3 to 3 always 0.

→ 3 to 4 is no direct edge hence infinite.

→ Now Same For 4 to 1 is ∞

4 to 2 is → weight 2 beay direct edge

4 to 3 → weight is direct 9

4 to 4 is 0.

→ Now our Next step which is $D1 \rightarrow D^2$

that Matrix was the direct Path..

but Now we can include via one and then we will see which is the minimum path.

example:- we have to go 2 to 3.

so agr hum previous Matrix jis Mai direct path hai waha par 2 to 3 direct path is 1.

so in via 1 we can go

2 to 1 and 1 to 3.

	1	2	3	4
1	0	8	∞	1
2	∞	0	1	∞
3	4	12	0	5
4	∞	2	9	0

so 1 to 1 is 0

→ 1 to 2 is 8 in direct Matrix.

and in this via 1 to 1 and 1 to 2.

Note:-

So is wajah sai first wala complete row and and first column same as it is Ukh Lo. as direct Matrix wala

So Now 2 to 2 always Zero 0

and Now 2 to 3

Previous Matrix Mai direct 1 tha.

→ aur ab 2 sai 1 jao and 1 to 3. jao

sa agaa hum jaa 2 to 1 to direct edge hai he nhi aur hamary paas already Minimum path hai which is 1 to wahi likh lo.

→ Now check 2 to 4.
so in direct Matrix 2 to 4 direct edge is infinity.

→ to 2 to 4 via 1
2-1 and 1-4
↳ and 2 sai 1 we don't have direct edge.
to agar via 1 bi infinity hee rahy gaa.

→ Now 3 sai 2 hum jaa sakty hai
3 sai 1 and 1 sai 2.
↳ 8 + 8 = 12
and in prev direct we had ∞.
to minimum kon sa rahe ga?
12 to 12 likh lo.

→ Now 3 to 4 we have infinity: So
so we can go via 1 like this 3 to 1 and
1 to 4 so 4+5 = 5 and 5 is less
than infinity so write the 5

Now 4 to 2 we have 2 in direct:
and in this 4 to 1 is not direction so ∞ but we have already minimum 2 so write that
Now 4 to 3 we have already 9 in direct
and we can't go via 1 no direct direction so keep 9

Now. Now 2 wali scan row and 2 waala sara column as it is like to previous waale jese

D^2

	1	2	3	4
1	0	8	9	1
2	∞	0	1	∞
3	4	12	0	5
4	∞	2	3	0

Now 1 to 3:-
to pehly hum jaate gai 2 se like this 1-2 and then 2 to 3 because Now we have 2 and 2 vertex.
so we have 1 to 2 → 8 sum and 2 to 3 we have 1 weight.
So 8+1 = 9

and Now we have 1 to 4 we have already weight 1.
so but via 1 to 2 → 8 and ~~5 to 4~~ and 2 to 4 is → 2 which is not directed path so keep 1.

Now 3 to 1 already have 4 but.
via 1 to 2 is 8 and and 2 to 4 is ~~12~~
so 8+2 is 10 which is larger.

Now 3 to 1 is already 4
and via 2 is
3-to 2 is 8 and 2 to 1 is no direct
Path. so keep 4.

and Now 3 to 3 is 0

Now
3 to 4 we have already 5 via 1 but
Now via 1,2

3 to 1 is 4
and 1 to 2 is 8
4+8 = 4.
and 2 to 4 is 2
so 12+2=14.
we have already minm 5.

⇒ Now 4 to 1 which is ∞ but via Now
1 to 2.
so 4 to 2 is 2 and 2 to 3 is 8 but
2 to 3 is not defined so keep ∞

Now 4 to 3 already have 9 but via Now
1 to 2 and 2.
so 4 to 2 is 2 and 2 to 3 is 1
2+1=3 is minm change it
and keep 4 to 4 4 is 0.

Now write using 3rd vertex so keeping

D_3

	1	2	3	4
1	0	8	9	1
2	6	0	1	6
3	4	12	0	5
4	7	2	3	0

Now D^4 = Many via 4

	1	2	3	4
1	0	3	4	1
2	5	0	1	6
3	4	7	0	5
4	7	2	3	0

Ans