Editorial - COVID-21 Variant

Graphs can be used to solve this question. Each person ***P*** in the room is considered as a vertex and each interaction ***N*** is considered as an edge in the graph.

Covid 19

We need to identify the transmittable edges for COVID-19 considering the given conditions. Then we can find the Minimum Spanning Tree(MST) of the graph that is formed by these transmittable edges.

If we can compute a MST that contains all vertices of the initial graph that are present in the MST of the graph for Covid 19, then COVID-19 is transmittable to everyone.

Covid 21

Follow the same process and identify the transmittable edges for COVID-21, and create the MST as above. By adding the weights(distances) of the edges of the MST created, we can find the minimum total distance the virus can transmit if one person did get infected.

If all the vertices of the initial graph are present in the computed MST of the new graph, and the sum of the weights is less than D_4, then COVID-21 is transmittable to everyone.

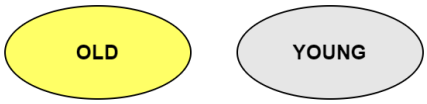
Note:

Common Algorithms used to find Minimum Spanning Tree,

1. Prim's Algorithm
2. Kruskal's Algorithm

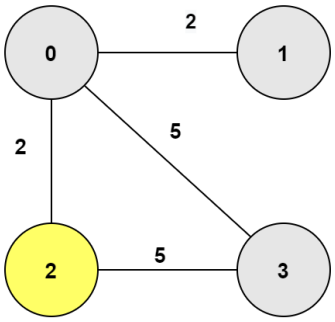
The data structures used would be dependent on the MST algorithm used.

Test Case 2



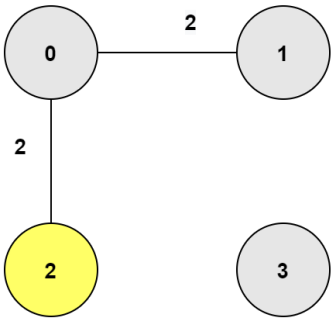
COVID-19 Spread

Initial Graph



$D_1 = 2$

New Graph (will be the MST as well)

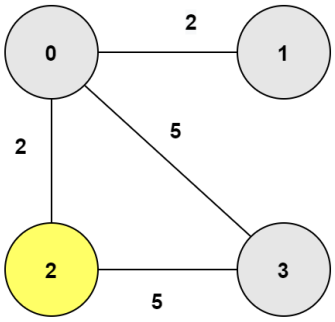


NO

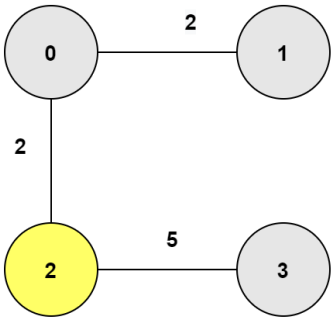
If the third person got sick initially, COVID-19 cannot be transmitted to anyone else in the room as D_1 = 2m. The virus cannot jump 5m.

COVID-21 Spread

Initial Graph



New Graph (will be the MST as well)



YES

The virus can jump 2m between young people and 5m between young and old people. The addition of the weights of the MST is 9 which is less than D_4.

$D_2 = 5$, $D_3 = 2$, $D_4 = 10$