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# Ans:- to task 3

As we know

V= Vertex & E= Edge

So for the problem 1 & problem 2 inside the dijkstra function, we see that there is on 'for loop' and another one is "while loop". If we look we can see that inside the "while loop" there are two "for loo" according to my code.

Now,

for "while loop" time complexity is O(V) again, inside the "while loop" first "for loop" time complexity is O->(E) & second loop time complexity is O(V) so

~~O(V+E)~~

$\Rightarrow \cancel{O(E) \cdot O(V) + O(V)}$

$\Rightarrow O(V) \cdot O(V+E) + O(V)$

$\Rightarrow O(V^2 + VE) + O(V)$

$\Rightarrow O(V^2)$

$\Rightarrow O(N^2)$

As $N$ = number of places

Similarly for problem 2

$\Rightarrow O(V) \cdot O(V+E) + O(V)$

$\Rightarrow O(V^2 + VE) + O(V)$

$\Rightarrow O(V^2) \Rightarrow O(N^2)$

Now,

if the number of titen's in each road is exactly 1,
BFS algorithm can solve this problem with $O(N+M)$ time complexity.

$N \Rightarrow$ places

$M \Rightarrow$ roads

We know BFS will search for the lowest number of roads needed to reach the final goal. For this, BFS algo will need 3 argument, The graph, starting places and final destination

As we have n places and m roads the time complexity will be $O(N+M)$

As we know time complexity depends of no of edges & vertices. The more edges & we have more time complexity will be needed to reach

As we are adding new edges, so vertices So this proportional to $(V+E)$

time complexity $= O(V+E)$