TASK3

We have used the Dijkstra's Algorithm in task1 and modified the code in task2.

The time complexity of the code in task1 is O(NlogN + M). And the space complexity is O(N+M) for storing all the edge connections in the adjacency list. where N is the number of vertices and M is the number of edges. On task 2, we only used an extra array for storing previous vertex. Which adds extra O(N) space. But the space complexity is already O(N+M). So the space complexity in task2 too is O(N+M).

Now, if the titans in each road is exactly 1, then the graph will be equivalent to an unweighted graph. In that case we can simply use Breadth First Search to find the shortest path. We know the time complexity of Breadth First Search algorithm is O(N + M).