

# Dijkstra: Shortest Reach 2



Given a graph consisting  $N$  nodes (labelled  $1$  to  $N$ ) where a specific given node  $S$  represents the starting position  $S$  and an edge between two nodes is of a given length, which may or may not be equal to other lengths in the graph.

It is required to calculate the shortest distance from the start position (Node  $S$ ) to all of the other nodes in the graph.

**Note:** If a node is unreachable, the distance is assumed as  $-1$ .

## Input Format

The first line contains  $T$ , denoting the number of test cases.

First line of each test case has two integers  $N$ , denoting the number of nodes in the graph and  $M$ , denoting the number of edges in the graph.

The next  $M$  lines each consist of three space-separated integers  $x y r$ , where  $x$  and  $y$  denote the two nodes between which the **undirected** edge exists,  $r$  denotes the length of edge between these corresponding nodes.

The last line has an integer  $S$ , denoting the starting position.

## Constraints

$$1 \leq T \leq 10$$

$$2 \leq N \leq 3000$$

$$1 \leq M \leq \frac{N \times (N-1)}{2}$$

$$1 \leq x, y, S \leq N$$

$$1 \leq r \leq 10^5$$

**If there are edges between the same pair of nodes with different weights, they are to be considered as is, like multiple edges.**

## Output Format

For each of the  $T$  test cases, print a single line consisting  $N - 1$  space separated integers denoting the shortest distance of  $N - 1$  nodes other than  $S$  from starting position  $S$  in increasing order of their labels.

For unreachable nodes, print  $-1$ .

## Sample Input

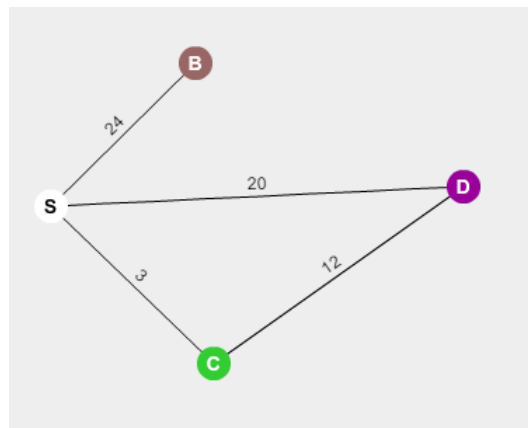
```
1
4 4
1 2 24
1 4 20
3 1 3
4 3 12
1
```

## Sample Output

```
24 3 15
```

## Explanation

The graph given in the test case is shown as :



- The straight line is a weighted edge, denoting length of edge between the corresponding nodes.
- The nodes S,B,C and D denote the obvious node 1,2,3 and 4 in the test case.

The shortest paths followed for the three nodes B,C and D are as follows :

**S->B** - Shortest Path Value : **24**

**S->C** - Shortest Path Value : **3**

**S->C->D** - Shortest Path Value : **15**