

# DIJKSTRA'S ALGORITHM

Given a weighted, undirected, and connected graph of  $n_{vertices}$ . Find the shortest path from vertex *start* to every vertex.

## 1 Input

- The first line contains an integer  $n_{vertices}$  ( $0 < n_{vertices} \leq 3000$ ) indicating the number of vertices in the graph.
- The next lines contain 3 integers  $vertex_1$ ,  $vertex_2$ , and weight each ( $0 \leq vertex_1, vertex_2 \leq n_{vertices} - 1, 0 < weight \leq 10^9$ ) indicating that there is an edge of weight between  $vertex_1$  and  $vertex_2$ . The number of these lines will not exceed  $10^5$ .
- After these lines there is a line containing three numbers -1.
- The last line contains an integer *start* indicating the vertex to begin the algorithm.

## 2 Output

$n_{vertices}$  lines contain the shortest distances from vertex *start* to each vertex from 0 to  $n_{vertices} - 1$

## 3 Example

**Input:**

```
5
0 4 4
1 0 4
3 0 4
2 4 2
4 3 2
3 1 3
0 2 1
2 1 2
-1 -1 -1
2
```

**Output:**

```
1
2
0
4
2
```