

# Breadth First Search: Shortest Reach

## Problem Statement

Given an undirected graph consisting of  $N$  nodes (labelled 1 to  $N$ ) where a specific given node  $S$  represents the start position and an edge between any two nodes is of length 6 units in the graph.

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

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

**Note 2:** The length of each edge in the graph is 6 units.

## 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 two space separated integers  $x$   $y$ , where  $x$  and  $y$  denote the two nodes between which the edge exists.

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

## Constraints

$$1 \leq T \leq 10$$

$$2 \leq N \leq 1000$$

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

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

## Output Format

For each of  $T$  test cases, print a single line consisting of  $N - 1$  space separated integers, denoting the shortest distances of the  $N-1$  nodes from starting position  $S$ .

For unreachable nodes, print  $-1$ .

## Sample Input

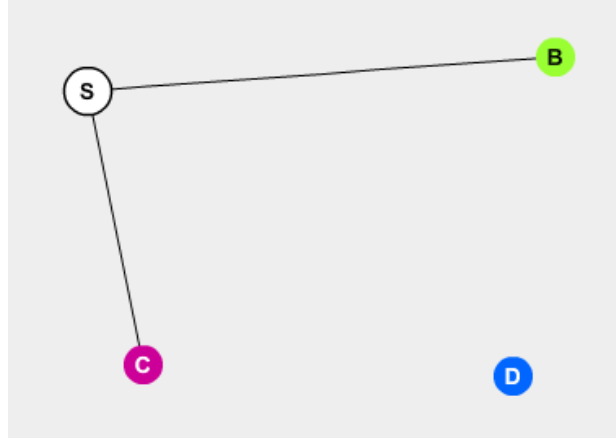
```
1
4 2
1 2
1 3
1
```

## Sample Output

```
6 6 -1
```

## Explanation

The graph given in the test case is shown as :



S denotes the node 1 in the test case and B,C and D denote 2,3 and 4. Since S is the starting node and the shortest distances from it are (1 edge, 1 edge, Infinity) to the nodes B,C and D (2,3 and 4) respectively.

Node D is unreachable, hence -1 is printed (not Infinity).