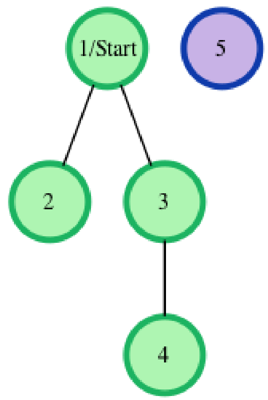
Breadth First Search: Shortest Reach

Consider an undirected graph where each edge weighs 6 units. Each of the nodes is labeled consecutively from 1 to n.

You will be given a number of queries. For each query, you will be given a list of edges describing an undirected graph. After you create a representation of the graph, you must determine and report the shortest distance to each of the other nodes from a given starting position using the *breadth-first search* algorithm (BFS). Return an array of distances from the start node in node number order. If a node is unreachable, return -1 for that node.

Example
The following graph is based on the listed inputs:



$n = 5$ // number of nodes
$m = 3$ // number of edges
$edges = [1, 2], [1, 3], [3, 4]$
$s = 1$ // starting node

All distances are from the start node 1. Outputs are calculated for distances to nodes 2 through 5: $[6, 6, 12, -1]$. Each edge is 6 units, and the unreachable node 5 has the required return distance of -1.

Function Description

Complete the *bfs* function in the editor below. If a node is unreachable, its distance is -1.

bfs has the following parameter(s):

- *int n*: the number of nodes
- *int m*: the number of edges
- *int edges[m][2]*: start and end nodes for edges
- *int s*: the node to start traversals from

Returns
int[n-1]: the distances to nodes in increasing node number order, not including the start node (-1 if a

node is not reachable)

Input Format

The first line contains an integer q, the number of queries. Each of the following q sets of lines has the following format:

- The first line contains two space-separated integers n and m, the number of nodes and edges in the graph.
- Each line i of the m subsequent lines contains two space-separated integers, u and v, that describe an edge between nodes u and v.
- The last line contains a single integer, s, the node number to start from.

Constraints

- $1 \leq q \leq 10$
- $2 \leq n \leq 1000$
- $1 \leq m \leq \frac{n \cdot (n-1)}{2}$
- $1 \leq u, v, s \leq n$

Sample Input

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

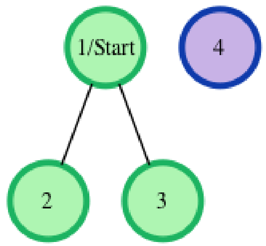
Sample Output

```
6 6 -1
-1 6
```

Explanation

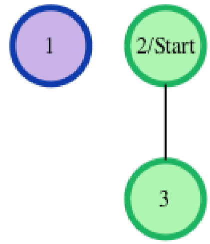
We perform the following two queries:

1. The given graph can be represented as:



where our *start* node, s, is node 1. The shortest distances from s to the other nodes are one edge to node 2, one edge to node 3, and an infinite distance to node 4 (which it is not connected to). We then return an array of distances from node 1 to nodes 2, 3, and 4 (respectively): $[6, 6, -1]$.

2. The given graph can be represented as:



where our *start* node, s, is node 2. There is only one edge here, so node 1 is unreachable from node 2 and node 3 has one edge connecting it to node 2. We then return an array of distances from node 2 to nodes 1, and 3 (respectively): $[-1, 6]$.

Note: Recall that the actual length of each edge is 6, and we return -1 as the distance to any node that is unreachable from s.