Tag
1) Multisource BFS

Problem Statement

Given a graph with N nodes and M edges. Also, some nodes are special nodes.
You are also given Q queries. In each query, you will be given a node.

For each query, find the shortest distance between the node and the closest special node.

With story -

Chennai is under lockdown due to the notorious virus named COVID-19.
There are totally N buildings in the city and M bidirectional roads connecting them. Each building can either be a hospital or a house. Each road (u,v) is of unit length. There are H hospitals in the city h_1, h_2, h_3, ... h_H . Everyone in the city is found to be affected by the virus. So, for each building, find the distance to its nearest hospital. If no hospital can be reached from a building, then print -1.

Constraints

1<=N<=1e5
1<=u,v<=N
1<=H<=N
1<=h_i<=N
Multiple edges and self loops won't be given in the input.

Input Format

The first line contains 2 integers N and M , the number of buildings and the number of roads in the city.
The next N-1 lines contains N-1 roads, where each road is described as ui vi.
u_1 v_1
u_2 v_2
..
..
u_{N-1} v_{N-1}

The next line contains H , the number of hospitals in the city.
The next line contains H space separated integers denoting the hospitals.

h_1 h_2 h_3 ... h_H

Output Format

Print a line with N space separated integers
For each query, print the shortest distance from x_i to the nearest hospital. If no hospital can be reached, then print -1.

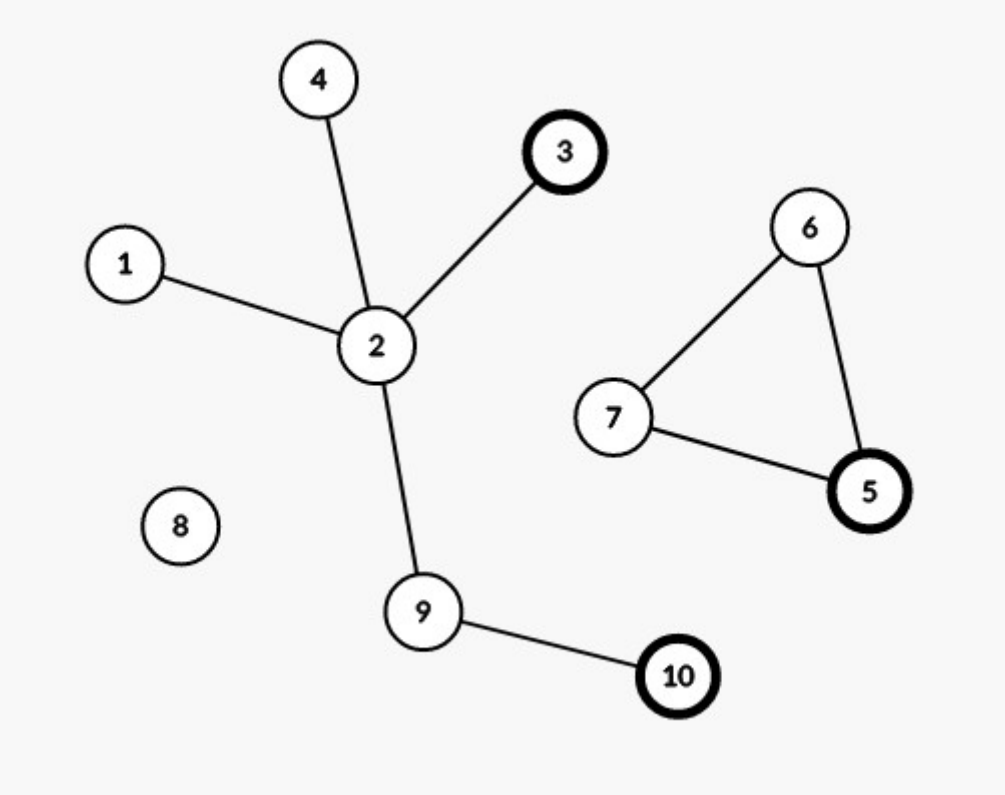
Sample Input

```
10 8
1 2
2 3
2 4
2 9
9 10
5 6
5 7
6 7
3
3 5 10
```

Sample Output

```
2 1 0 2 0 1 1 -1 1 0
```

Explanation



The above diagram is the graph of the city as given in the sample input.
The hospitals are as marked in figure.
For 1, the nearest hospital is 3 and the distance is 2.
For 2, the nearest hospital is 3 and the distance is 1.
For 3, the nearest hospital is 3 (itself) and the distance is 0.
For 4, the nearest hospital is 3 and the distance is 4.
For 5, the nearest hospital is 5 (itself) and the distance is 0.
For 6, the nearest hospital is 5 and the distance is 1.
For 7, the nearest hospital is 5 and the distance is 1.
For 8, no hospital can be reached, so -1 is printed.
For 9, the nearest hospital is 10 and the distance is 1.
For 10, the nearest hospital is 10 (itself) and the distance is 0.