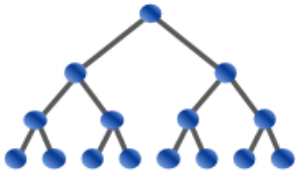

USACO 2026 Third Contest, Gold
Problem 2. Picking Flowers

Not submitted yet

English (en)

****Note: The time limit for this problem is 3s, 1.5x the default.****

Farmer John's farm structure can be represented as a connected undirected graph with N vertices and M unweighted edges ($2 \le N \le 2 \cdot 10^5, N-1 \le M \le 2 \cdot 10^5$). Initially, Farmer John is at his barn, represented by farm 1.

Initially, farms $s_1, s_2, \dots, s_K$ contain flower fields and farms $d_1, d_2, \dots, d_L$ are destination farms. FJ calls a path pretty if:

- It starts at farm 1.
- It ends at some destination farm x.
- There is no shorter path starting at farm 1 and ending at farm x.
- FJ visits all flower fields along the way.

FJ can wave his magic wand and make up to one more farm contain a flower field (if it doesn't already). However, FJ isn't very decisive. For farms f numbered 2 through N, after FJ temporarily makes farm f contain a flower field, determine if there exists a pretty path.

Note that there are multiple test cases, and each case must be treated independently.

INPUT FORMAT (input arrives from the terminal / stdin):

The first line contains T ($1 \le T \le 100$), the number of independent test cases.

The first line of each test case contains N, M, K, and L ($0 \le K \le N-1, 1 \le L \le N-1$).

The following line contains $s_1, s_2, \dots, s_K$ ($2 \le s_i \le N$, s_i are all distinct).

The following line contains $d_1, d_2, \dots, d_L$ ($2 \le d_i \le N$, d_i are all distinct).

The following M lines contain u and v, denoting there is an undirected edge between farms u and v. All edges are considered to have equal length. It is guaranteed that there aren't any multi-edges or self loops.

It is guaranteed that both the sum of N and the sum of M do not exceed 10^6 over all test cases.

OUTPUT FORMAT (print output to the terminal / stdout):

For each test case, output a binary string of length $N-1$. The i'th character in the string should be 1 if the answer holds true for the $(i+1)$'th farm.

SAMPLE INPUT:

```
1

7 7 0 1

5
1 2
2 3
3 4
4 5
5 6
6 7
3 6
```

SAMPLE OUTPUT:

```
111110
```

Since 5 is the only destination farm, the answer holds true if the i'th farm lies on any shortest path from 1 to 5.

There are two shortest paths from 1 to 5, which are $1 \to 2 \to 3 \to 4 \to 5$ and $1 \to 2 \to 3 \to 6 \to 5$.

Since there are no farms that already contain flower fields, the answer for farm i holds true if farm i lies on at least one of the two aforementioned paths.

SAMPLE INPUT:

```
1
6 6 0 2

5 3
1 2
2 3
3 4
4 5
5 6
2 5
```

SAMPLE OUTPUT:

```
11010
```

There are two destination farms: 5 and 3. Since there are no farms that already contain flower fields, the i'th farm must lie on a shortest path to either 5 or 3. Since farm 2 lies on a shortest path to farm 5, so the answer holds for farm 2. Trivially, farm 3 lies on the shortest path to farm 3 and farm 5 lies on the shortest path to farm 5.

SAMPLE INPUT:

```
3
4 3 2 1
2 3
4
1 2
2 3
3 4
4 4 2 1
2 3
4
1 2
1 3
2 4
3 4
5 5 2 1
2 4
5
1 2
1 3
2 4
3 4
4 5
```

SAMPLE OUTPUT:

```
111
000
1011
```

For the first test case, the answer holds true for the i'th farm if FJ can pass through farm i, farm 2, and farm 3 (in no particular order) on some shortest path to farm 4. It can be shown that the answer holds true for all farms.

SCORING:

- Inputs 4-6: $K = 0$ and $L = 1$
- Inputs 7-9: $K = 0$
- Inputs 10-23: No additional constraints

Problem credits: Chongtian Ma

Language: C

Source File: 选取文件 未选择文件

Submit Solution