Problem F. Find the Circuit

Input file:	*standard input*
Output file:	*standard output*
Time limit:	4 seconds
Memory limit:	1024 mebibytes

This is a communication problem. Your solution will be run twice on each test.

First Run

You are given a connected undirected graph with n vertices and m edges. You are also given a special sequence of length k with vertex numbers $p_1, \ldots, p_k$ such that a simple cycle $p_1 - p_2 - \ldots - p_k - p_1$ exists in the graph. You must assign a direction to each edge of the graph.

Second Run

Before the second run, the jury shuffles the labels of all vertices, and also shuffles the order of the edges that you output on the first run. You are given the resulting directed graph. Your task is to find the image of the cycle from the first run under this permutation: you must output the new labels of all the vertices on the cycle, starting from any vertex but maintaining their order.

Input

The first line contains an integer op ($op \in \{1, 2\}$), denoting the run number.

The second line contains two integers, n and m ($3 \le n \le m \le 5 \cdot 10^5$), the number of vertices and edges of the graph given to you. If $op = 1$, the graph is undirected; if $op = 2$, the graph is directed. The graph is connected and has no self-loops or multiple edges.

Each of the following m lines contains two integers, u and v ($1 \le u, v \le n$), representing the edges in the graph. If the graph is directed, then the direction is $u \to v$.

If $op = 1$, the next line contains an integer k ($3 \le k \le n$), the length of the cycle. The following line contains k integers $p_1, \ldots, p_k$, the vertices on the cycle in order. This cycle exists in the graph given above: there are edges (p_1, p_2), (p_2, p_3), …, (p_k, p_1).

Output

If $op = 1$, you must assign a direction to each edge. Output m lines, each containing two integers u and v, denoting a directed edge $u \to v$. You may output the edges in any order, but you must output each edge from the input exactly once (with one of its two possible directions).

If $op = 2$, you must output the vertices of the cycle from the first run, using the shuffled labels and maintaining the cyclic order.

Note that your output should preserve the given cycle direction. For example, suppose the given sequence on the first run is 1 2 3 4, and after shuffling the vertex labels, it becomes 3 1 4 2. Then both outputs 3 1 4 2 and 4 2 3 1 will be accepted, as they represent cyclic shifts of the same directed cycle. On the other hand, output 2 4 1 3 will be rejected, since it corresponds to the reversed direction.

Examples

standard input	*standard output*
1 5 6 1 2 2 5 2 3 3 4 3 5 4 5 4 2 3 4 5	2 3 3 4 5 2 3 5 4 5 1 2
2 5 6 3 5 2 1 4 5 5 2 2 4 1 4	1 4 5 2

Note

The examples show two runs of a particular solution on the example. After the first run, the labels of vertices $1, 2, 3, 4, 5$ are permuted into $3, 5, 2, 1, 4$. When your solution is checked, the permutation may be different.