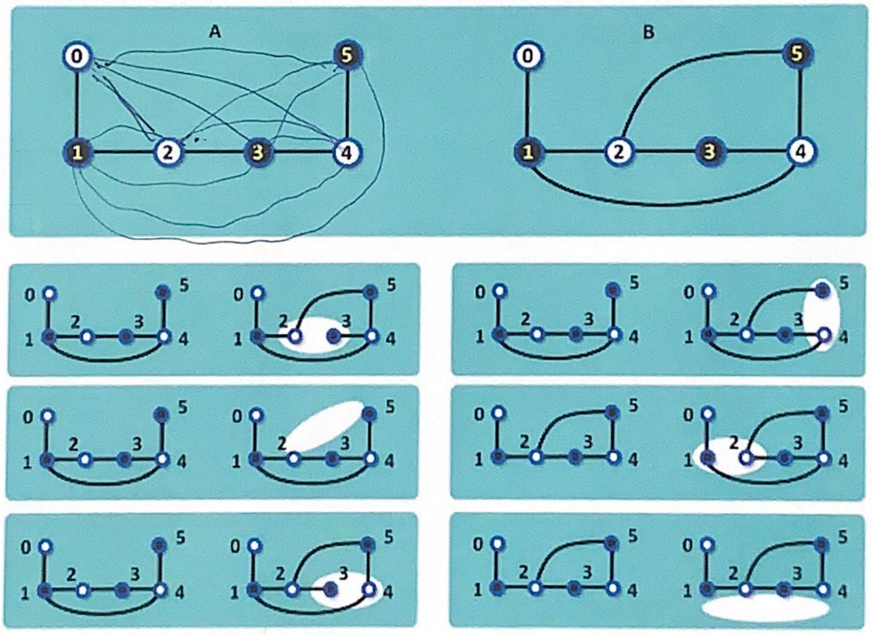
Network Topology Fix

The topologies of the two separate networks, A and B, in the campus are planned to be identical. Both networks consist of fast servers and regular servers, and the connections between them. The number of servers, the number of fast servers and the number of connections is planned to be the same in both networks. Moreover, the topologies of both networks are to be identical. It means, that there will be a one-to-one mapping between the servers in the networks. The mapping will map each server in network A to a server of the same kind (fast, regular) in network B. Furthermore, two servers, x and y, in network A will be connected if and only if there will be other two connected servers, z and w, in network B, and the mapping will map x to z and y to w.

Both networks were built gradually. First, all servers were delivered and activated and then, one after another, connections among particular servers were installed.
However, when all connections in network B were completed and there was the last connection to be installed in network A, a mistake happened. The delivering company made an error in coordinates of the last connection and instead of installing the connection in network A they chose network B. There, they made another mistake, and wrongly installed the connection between two, yet not connected, servers which were chosen in effect randomly. Consequently, now network B contains one more connection than it should contain, and network A contains one less connection than it should contain.

The company is going to move the wrong connection from network B to network A, to fix the issue. The company analysts noticed an important feature which may simplify the fix. The costs of manipulating the connections at physically different locations in both networks may differ significantly. In determining the topology, only connections are relevant, physical location of servers and connections are not relevant. Also, the labels of the servers, if there are any, are considered to be temporary and not relevant as well. Therefore, it may be cheaper to remove some other connection from network B than the improperly installed one, and also it may be cheaper to install the last connection between other servers in network A than originally planned. If the topologies of both networks are identical after the fix, there is a chance the owners of the network may still consider the solution acceptable.



~~0 4~~ 3

1 3 5

3 1 5
5 1 3
5 3 1

Figure 1. The top part shows networks A and B before the fix. Fast servers are depicted as dark nodes. The bottom part depicts all possible ways to fix the networks. In each of them, one connection is removed from B and one is added to A. The (approximate) location of removed connection in network B is highlighted. The added connection in network A is {1, 4} in the first four cases, and {2, 5} in the last two cases (bottom right). Note that the shared networks topology resulting from the fix in those last two cases differs from the shared topology in the previous cases. The schemes correspond to Example 1 below.

The task

You are given the topologies of both networks before the fix. Produce a list of all pairs of locations where the last connection may be installed in network A and where a connection may be removed in network B, so that the resulting topologies of both networks become identical.

Input

The first input line contains three integers N, C, F, where N is the number of servers in each network, C is the *planned* number of connections in each network, and F is the number of fast servers in each network. The servers in each network are labeled 0, 1, 2, ..., $N-1$. The next line contains F integers, separated by spaces, representing the labels of fast servers in network A. Next, there are $C-1$ lines, each line describes one existing connection between two servers in network A. The next line contains F integers, separated by spaces, representing the labels of fast servers in network B. Finally, there are $C+1$ lines, each line describes one existing connection between two servers in network B, in the same format as in network A.
The connections in both networks, and also each particular connection are given in arbitrary order.
It holds, $4 \le N \le 15$, $N-1 \le C \le 40$, $0 \le F \le N$.

Output

The output contains one or more text lines. Each line contains four integers a, b, c, d, separated by space, which specify a connection fix. The integers a, b ($a < b$) are the labels of two servers in network A, between which a final connection may be installed. The integers c, d ($c < d$) are the labels of two servers in network B, between which a connection may be removed. Both networks, after the change described on the output line, share identical topology. The output lines list all possible changes and are sorted in ascending lexicographical order of quadruples (a, b, c, d). The presented data generate always at least one output line. The number of output lines does not exceed 100.

Example 1

Input

```
6 6 3
1 3 5
0 1
1 2
2 3
3 4
4 5
1 3 5
0 1
1 2
1 4
2 3
2 5
3 4
4 5
```

N C F
FAST
connections

Output

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

The data of Example 1 is depicted in Figure 1.

Example 2

Input

```
7 7 1
1
0 1
1 2
1 5
2 3
3 4
3 6
4
0 1
0 4
1 2
1 3
2 3
4 5
4 6
5 6
```

Output

```
0 5 2 3
4 6 5 6
```

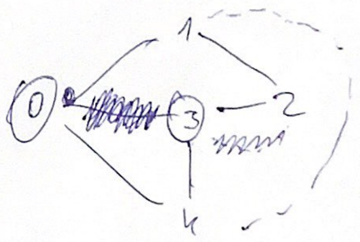
Example 3

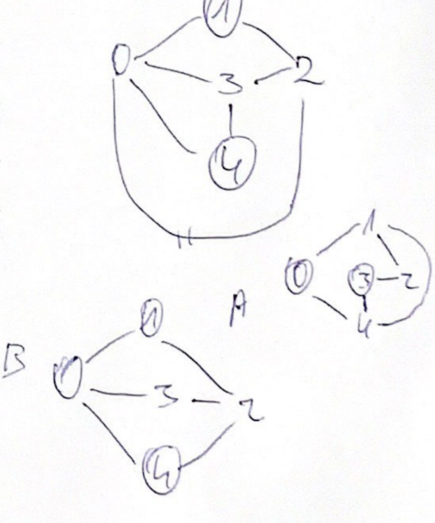
Input

```
5 6 2
0 3
0 1
0 4
1 2
2 3
3 4
1 4
0 4
0 3
0 1
0 2
1 2
2 3
3 4
```

Output

```
1 4 0 2
1 4 0 3
2 4 0 2
2 4 0 3
```




1
0
3
2
4
H
A
1
0
3
2
4
B
1
0
3
2
4