



## CTU Open Contest 2026

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### Cables

`cables.(c|cpp|py), Cables.(java|kt)`

Míša is building an efficient computer network and wants to test it under load. His network consists of  $n$  computers, which are connected using  $k$  different types of cables. All cables of the same type must transmit the same amount of data. Each cable can transmit data only in one direction. Míša is able to transmit any amount of data through the cables. He is also able to reverse the direction of all the cables of the same type. He would like to transmit data in such a way that each computer sends out the same amount of data as it receives, and at least one cable transmits a non-zero amount of data.

The types of cables have a fixed defined order. Míša selects a contiguous subsequence of those types. Then for each selected cable type he selects the direction and amount of data going through. After the selection the data flow has to be balanced at each computer. Help Míša find the shortest such subsequence.

More formally, Míša is given a sequence of directed edge sets  $E_1, E_2, \dots, E_k$ , each  $E_i$  representing the cables of type  $i$ . A contiguous nonempty block  $E_i, E_{i+1}, \dots, E_j$  is *balanced* if Míša can, for each type  $q \in \{i, i+1, \dots, j\}$ , choose whether to reverse all edges of  $E_q$  and choose a non-negative real amount  $x_q$ , such that

- at least one of the amounts  $x_i, x_{i+1}, \dots, x_j$  is non-zero, and
- when every edge of type  $q$  transmits the amount  $x_q$  in its chosen direction, the total incoming amount equals the total outgoing amount at each computer.

Equivalently, the amounts  $x_q$  may be arbitrary real numbers (not all zero), where a negative amount means that the edges of type  $q$  are reversed.

Your task is to find a balanced block of minimum length  $j - i + 1$ , or determine that no balanced block exists.

### Input Specification

The first line contains two integers  $n$  and  $k$  ( $2 \leq n \leq 100$ ,  $1 \leq k \leq 2 \cdot 10^5$ ), the number of computers and the number of cable types.

The  $k$  cable types follow, in order; the  $i$ -th of them is the edge set  $E_i$ . Each type is described by a line containing the number of cables  $|E_i|$  ( $|E_i| \geq 1$ ), followed by  $|E_i|$  lines, each containing two integers  $u$  and  $v$  ( $1 \leq u, v \leq n$ ,  $u \neq v$ ), meaning that a cable of this type transmits data from computer  $u$  to computer  $v$ . The computers are numbered 1 to  $n$ .

Within a single type no two cables share the same ordered pair  $(u, v)$ , and no type contains both cables  $(u, v)$  and  $(v, u)$  for any pair  $u, v$ .

The total number of cables satisfies  $|E_1| + |E_2| + \dots + |E_k| \leq 10^6$ .

## Output Specification

Output a single integer: the smallest number of consecutive cable types Míša can select so that the data can be transmitted in the balanced way, that is, the minimum length  $j - i + 1$  of a balanced block  $E_i, E_{i+1}, \dots, E_j$ .

If no balanced block exists, output  $-1$ .

### Sample Input 1

3 3  
2  
1 2  
2 3  
2  
2 3  
3 1  
2  
1 3  
2 1

### Output for Sample Input 1

3

### Sample Input 2

3 3  
1  
1 2  
1  
2 3  
2  
3 1  
3 2

### Output for Sample Input 2

3

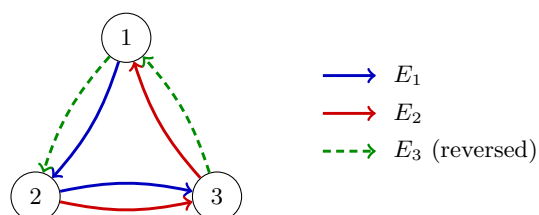
### Sample Input 3

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

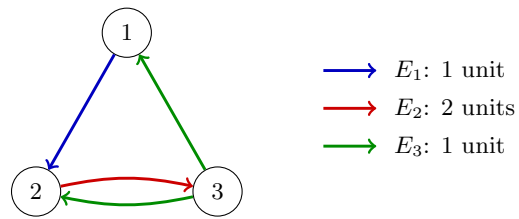
### Output for Sample Input 3

-1

In the first sample the shortest balanced block is all three types, each used once with  $E_3$  reversed.



In the second sample the shortest balanced block is all three types, none reversed, with  $E_2$  carrying two units of data and  $E_1, E_3$  one unit each.



In the third sample no block is balanced, even though together the cables go around the cycle  $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 1$ . At computer 2 the two cables of  $E_1$  cancel out, so the cable  $1 \rightarrow 2$  of  $E_3$  cannot be balanced and  $E_3$  must carry nothing. Then computer 4 is touched only by  $E_2$ , and after that computer 1 only by  $E_1$ , so all amounts are zero.

