

## F. Radio Stations

time limit per test: 7 seconds  
 memory limit per test: 256 megabytes  
 input: standard input  
 output: standard output

In addition to complaints about lighting, a lot of complaints about insufficient radio signal covering has been received by Bertown city hall recently.  $n$  complaints were sent to the mayor, all of which are suspiciously similar to each other: in the  $i$ -th complaint, one of the radio fans has mentioned that the signals of two radio stations  $x_i$  and  $y_i$  are not covering some parts of the city, and demanded that the signal of **at least one** of these stations can be received in the whole city.

Of course, the mayor of Bertown is currently working to satisfy these complaints. A new radio tower has been installed in Bertown, it can transmit a signal with any integer power from 1 to  $M$  (let's denote the signal power as  $f$ ). The mayor has decided that he will choose a set of radio stations and establish a contract with every chosen station. To establish a contract with the  $i$ -th station, the following conditions should be met:

- the signal power  $f$  should be not less than  $l_i$ , otherwise the signal of the  $i$ -th station won't cover the whole city;
- the signal power  $f$  should be not greater than  $r_i$ , otherwise the signal will be received by the residents of other towns which haven't established a contract with the  $i$ -th station.

All this information was already enough for the mayor to realise that choosing the stations is hard. But after consulting with specialists, he learned that some stations the signals of some stations may interfere with each other: there are  $m$  pairs of stations  $(u_i, v_i)$  that use the same signal frequencies, and for each such pair it is impossible to establish contracts with both stations. **If stations  $x$  and  $y$  use the same frequencies, and  $y$  and  $z$  use the same frequencies, it does not imply that  $x$  and  $z$  use the same frequencies.**

The mayor finds it really hard to analyze this situation, so he hired you to help him. You have to choose signal power  $f$  and a set of stations to establish contracts with such that:

- all complaints are satisfied (formally, for every  $i \in [1, n]$  the city establishes a contract either with station  $x_i$ , or with station  $y_i$ );
- no two chosen stations interfere with each other (formally, for every  $i \in [1, m]$  the city **does not** establish a contract either with station  $u_i$ , or with station  $v_i$ );
- for each chosen station, the conditions on signal power are met (formally, for each chosen station  $i$  the condition  $l_i \leq f \leq r_i$  is met).

### Input

The first line contains 4 integers  $n, p, M$  and  $m$  ( $2 \leq n, p, M, m \leq 4 \cdot 10^5$ ) — the number of complaints, the number of radio stations, maximum signal power and the number of interfering pairs, respectively.

Then  $n$  lines follow, which describe the complains. Each line contains two integers  $x_i$  and  $y_i$  ( $1 \leq x_i < y_i \leq p$ ) — the indices of the radio stations mentioned in the  $i$ -th complaint). **All complaints are distinct.**

Then  $p$  lines follow, which describe the radio stations. Each line contains two integers  $l_i$  and  $r_i$  ( $1 \leq l_i \leq r_i \leq M$ ) — the constraints on signal power that should be satisfied if the city establishes a contract with the  $i$ -th station.

Then  $m$  lines follow, which describe the pairs of interfering radio stations. Each line contains two integers  $u_i$  and  $v_i$  ( $1 \leq u_i < v_i \leq p$ ) — the indices of interfering radio stations. **All these pairs are distinct.**

### Output

If it is impossible to choose signal power and a set of stations to meet all conditions, print  $-1$ .

### Codeforces Round #585 (Div. 2)

[Finished](#)
[Practice](#)


### → Virtual participation

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

[Start virtual contest](#)

### → Practice

You are registered for practice. You can solve problems unofficially. Results can be found in the contest status and in the bottom of standings.

### → Clone Contest to Mashup

You can clone this contest to a mashup.

[Clone Contest](#)

### → Submit?

Language: GNU G++11 5.1.0

Choose file: 选择文件 未选择任何文件

Be careful: there is 50 points penalty for submission which fails the pretests or resubmission (except failure on the first test, denial of judgement or similar verdicts). "Passed pretests" submission verdict doesn't guarantee that the solution is absolutely correct and it will pass system tests.



[Submit](#)

### → Problem tags

2-sat

No tag edit access

### → Contest materials

- Announcement #1 (en) 
- Announcement #2 (ru) 

Otherwise print two integers  $k$  and  $f$  in the first line — the number of stations in the chosen set and the chosen signal power, respectively. In the second line print  $k$  **distinct** integers from 1 to  $p$  — the indices of stations to establish contracts with (in any order). If there are multiple answers, print any of them; you don't have to minimize/maximize the number of chosen stations, and the same applies to signal power.

**Examples**

input	Copy
2 4 4 2 1 3 2 3 1 4 1 2 3 4 1 4 1 2 3 4	
output	Copy
2 3 1 3	

input	Copy
2 4 4 2 1 3 2 4 1 2 1 2 3 4 3 4 1 2 3 4	
output	Copy
-1	

[Codeforces](#) (c) Copyright 2010-2019 Mike Mirzayanov  
The only programming contests Web 2.0 platform  
Server time: Sep/17/2019 16:23:54<sup>UTC+8</sup> (e2).  
Desktop version, switch to [mobile version](#).  
[Privacy Policy](#)

Supported by



ITMO UNIVERSITY