A. Football

time limit per test: 1 second

memory limit per test: 256 megabytes

input: standard input

output: standard output

One day, at the "Russian Code Cup" event it was decided to play football as an out of competition event. All participants was divided into n teams and played several matches, two teams could not play against each other more than once.

The appointed Judge was the most experienced member — Pavel. But since he was the wisest of all, he soon got bored of the game and fell asleep. Waking up, he discovered that the tournament is over and the teams want to know the results of all the matches.

Pavel didn't want anyone to discover about him sleeping and not keeping an eye on the results, so he decided to recover the results of all games. To do this, he asked all the teams and learned that the real winner was friendship, that is, each team beat the other teams exactly k times. Help Pavel come up with chronology of the tournir that meets all the conditions, or otherwise report that there is no such table.

Input

The first line contains two integers — n and k ($1 \leq n, k \leq 1000$).

Output

In the first line print an integer m — number of the played games. The following m lines should contain the information about all the matches, one match per line. The i-th line should contain two integers a_i and b_i ($1 \leq a_i, b_i \leq n; a_i \neq b_i$). The numbers a_i and b_i mean, that in the i-th match the team with number a_i won against the team with number b_i. You can assume, that the teams are numbered from 1 to n.

If a tournir that meets the conditions of the problem does not exist, then print -1.

Sample test(s)

input
3 1

output
3 1 2 2 3 3 1

B. Cunning Gena

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

A boy named Gena really wants to get to the "Russian Code Cup" finals, or at least get a t-shirt. But the offered problems are too complex, so he made an arrangement with his n friends that they will solve the problems for him.

The participants are offered m problems on the contest. For each friend, Gena knows what problems he can solve. But Gena's friends won't agree to help Gena for nothing: the i-th friend asks Gena x_i rubles for his help **in solving all the problems** he can. Also, the friend agreed to write a code for Gena only if Gena's computer is connected to at least k_i monitors, each monitor costs b rubles.

Gena is careful with money, so he wants to spend as little money as possible to solve all the problems. Help Gena, tell him how to spend the smallest possible amount of money. Initially, there's no monitors connected to Gena's computer.

Input

The first line contains three integers n, m and b ($1 \le n \le 100$; $1 \le m \le 20$; $1 \le b \le 10^9$) — the number of Gena's friends, the number of problems and the cost of a single monitor.

The following $2n$ lines describe the friends. Lines number $2i$ and $(2i+1)$ contain the information about the i-th friend. The $2i$-th line contains three integers x_i, k_i and m_i ($1 \le x_i \le 10^9$; $1 \le k_i \le 10^9$; $1 \le m_i \le m$) — the desired amount of money, monitors and the number of problems the friend can solve. The $(2i+1)$-th line contains m_i distinct positive integers — the numbers of problems that the i-th friend can solve. The problems are numbered from 1 to m.

Output

Print the minimum amount of money Gena needs to spend to solve all the problems. Or print -1, if this cannot be achieved.

Sample test(s)

input
```
2 2 1
100 1 1
2
100 2 1
1
```

output
```
202
```

input
```
3 2 5
100 1 1
1
100 1 1
2
200 1 2
1 2
```

output
```
205
```

input
```
1 2 1
1 1 1
1
```

output
```
-1
```

C. Square Table

While resting on the ship after the "Russian Code Cup" a boy named Misha invented an interesting game. He promised to give his quadrocopter to whoever will be the first one to make a rectangular table of size $n \times m$, consisting of positive integers such that the sum of the squares of numbers for each row and each column was also a square.

Since checking the correctness of the table manually is difficult, Misha asks you to make each number in the table to not exceed 10^8.

Input

The first line contains two integers n and m $(1 \le n, m \le 100)$ — the size of the table.

Output

Print the table that meets the condition: n lines containing m integers, separated by spaces. If there are multiple possible answers, you are allowed to print anyone. It is guaranteed that there exists at least one correct answer.

Sample test(s)

input
```
1 1
```
output
```
1
```

input
```
1 2
```
output
```
3 4
```

D. Big Problems for Organizers

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

The Finals of the "Russian Code Cup" 2214 will be held in n hotels. Two hotels (let's assume that they are the main hotels), will host all sorts of events, and the remaining hotels will accommodate the participants. The hotels are connected by $n - 1$ roads, you can get from any hotel to any other one.

The organizers wonder what is the minimum time all the participants need to get to the main hotels, if each participant goes to the main hotel that is nearest to him and moving between two hotels connected by a road takes one unit of time.

The hosts consider various options for the location of the main hotels. For each option help the organizers to find minimal time.

Input

The first line contains an integer n ($2 \le n \le 100000$) — the number of hotels. The next $n - 1$ lines contain two integers each — the numbers of the hotels that have a road between them. Consider hotels are numbered from 1 to n.

The next line contains an integer m ($1 \le m \le 100000$) — the number of queries. The following m lines contains two distinct integers each — the numbers of the hotels we assume to be the main.

Output

For each request of the organizers print a single integer — the time that all participants need to reach the main hotels.

Sample test(s)

input
3
2 3
3 1
3
2 1
2 3
3 1

output
1
1
1

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

output
2
1
2

E. Tricky Password

time limit per test: 3.5 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

In order to ensure confidentiality, the access to the "Russian Code Cup" problems is password protected during the problem development process.

To select a password, the jury can generate a special table that contains n columns and the infinite number of rows. To construct a table, the first row is fixed, and all the others are obtained by the following rule:

In the row i at position p there is a number equal to the number of times $a[i - 1][p]$ occurs on the prefix $a[i - 1][1 ... p]$.

To ensure the required level of confidentiality, the jury must be able to perform the following operations:

- Replace number $a[1][p]$ by v and rebuild the table.
- Find the number $a[x][y]$, which will be the new password.

Doing all these steps manually is very tedious, so the jury asks you to help him. Write a program that responds to the request of the jury.

Input
The first line contains an integer n ($1 \leq n \leq 100000$) — the number of columns. The second line contains the description of the first row of the table, that is, n integers, which are not less than 1 and do not exceed 10^9.

The third line of the input contains an integer m ($1 \leq m \leq 100000$) — the number of requests.

Next, each row contains a description of the request, which consists of three integers:

- If the first number is equal to 1, then the remaining two numbers are v, p ($1 \leq v \leq 10^9$; $1 \leq p \leq n$). So, you should put value v in the position p in the first row.
- If the first number is equal to 2, then the remaining two numbers are x, y ($1 \leq x \leq 10^5$; $1 \leq y \leq n$) — the row and column of the table cell from which you want to get value.

Output
Print an answer for each request of the second type in the order you receive them.

Sample test(s)

input
```
6
1 2 2 2 3 1
3
2 2 3
1 3 3
2 3 4
```

output
```
2
1
```