Codeforces β Sponsored by Telegram

Codeforces Round #364 (Div. 2)

A. Cards

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

There are n cards (n is **even**) in the deck. Each card has a positive integer written on it. $n / 2$ people will play new card game. At the beginning of the game each player gets two cards, each card is given to exactly one player.

Find the way to distribute cards such that the sum of values written of the cards will be equal for each player. It is guaranteed that it is always possible.

Input

The first line of the input contains integer n $(2 \le n \le 100)$ — the number of cards in the deck. It is guaranteed that n is even.

The second line contains the sequence of n positive integers $a_1, a_2, ..., a_n$ $(1 \le a_i \le 100)$, where a_i is equal to the number written on the i-th card.

Output

Print $n / 2$ pairs of integers, the i-th pair denote the cards that should be given to the i-th player. Each card should be given to exactly one player. Cards are numbered in the order they appear in the input.

It is guaranteed that solution exists. If there are several correct answers, you are allowed to print any of them.

Examples

input

```
6
1 5 7 4 4 3
```

output

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

input

```
4
10 10 10 10
```

output

```
1 2
3 4
```

Note

In the first sample, cards are distributed in such a way that each player has the sum of numbers written on his cards equal to 8.

In the second sample, all values a_i are equal. Thus, any distribution is acceptable.

B. Cells Not Under Attack

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

Vasya has the square chessboard of size $n \times n$ and m rooks. Initially the chessboard is empty. Vasya will consequently put the rooks on the board one after another.

The cell of the field is under rook's attack, if there is at least one rook located in the same row or in the same column with this cell. If there is a rook located in the cell, this cell is also under attack.

You are given the positions of the board where Vasya will put rooks. For each rook you have to determine the number of cells which are **not under attack** after Vasya puts it on the board.

Input

The first line of the input contains two integers n and m ($1 \le n \le 100\,000$, $1 \le m \le min(100\,000, n^2)$) — the size of the board and the number of rooks.

Each of the next m lines contains integers x_i and y_i ($1 \le x_i, y_i \le n$) — the number of the row and the number of the column where Vasya will put the i-th rook. Vasya puts rooks on the board in the order they appear in the input. It is guaranteed that any cell will contain no more than one rook.

Output

Print m integer, the i-th of them should be equal to the number of cells that are not under attack after first i rooks are put.

Examples

input

```
3 3
1 1
3 1
2 2
```

output

```
4 2 0
```

input

```
5 2
1 5
5 1
```

output

```
16 9
```

input

```
100000 1
300 400
```

output

```
9999800001
```

Note

On the picture below show the state of the board after put each of the three rooks. The cells which painted with grey color is not under the attack.

C. They Are Everywhere

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

Sergei B., the young coach of Pokemons, has found the big house which consists of n flats ordered in a row from left to right. It is possible to enter each flat from the street. It is possible to go out from each flat. Also, each flat is connected with the flat to the left and the flat to the right. Flat number 1 is only connected with the flat number 2 and the flat number n is only connected with the flat number n - 1.

There is exactly one Pokemon of some type in each of these flats. Sergei B. asked residents of the house to let him enter their flats in order to catch Pokemons. After consulting the residents of the house decided to let Sergei B. enter one flat from the street, visit several flats and then go out from some flat. But they won't let him visit the same flat more than once.

Sergei B. was very pleased, and now he wants to visit as few flats as possible in order to collect Pokemons of all types that appear in this house. Your task is to help him and determine this minimum number of flats he has to visit.

Input

The first line contains the integer n $(1 \le n \le 100\,000)$ — the number of flats in the house.

The second line contains the row s with the length n, it consists of uppercase and lowercase letters of English alphabet, the i-th letter equals the type of Pokemon, which is in the flat number i.

Output

Print the minimum number of flats which Sergei B. should visit in order to catch Pokemons of all types which there are in the house.

Examples

input

```
3
AaA
```

output

```
2
```

input

```
7
bcAAcbc
```

output

```
3
```

input

```
6
aaBCCe
```

output

```
5
```

Note

In the first test Sergei B. can begin, for example, from the flat number 1 and end in the flat number 2.

In the second test Sergei B. can begin, for example, from the flat number 4 and end in the flat number 6.

In the third test Sergei B. must begin from the flat number 2 and end in the flat number 6.

D. As Fast As Possible

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

On vacations n pupils decided to go on excursion and gather all together. They need to overcome the path with the length l meters. Each of the pupils will go with the speed equal to v_1. To get to the excursion quickly, it was decided to rent a bus, which has seats for k people (it means that it can't fit more than k people at the same time) and the speed equal to v_2. In order to avoid seasick, each of the pupils want to get into the bus **no more than once**.

Determine the minimum time required for all n pupils to reach the place of excursion. Consider that the embarkation and disembarkation of passengers, as well as the reversal of the bus, take place immediately and this time can be neglected.

Input

The first line of the input contains five positive integers n, l, v_1, v_2 and k ($1 \le n \le 10\,000$, $1 \le l \le 10^9$, $1 \le v_1 < v_2 \le 10^9$, $1 \le k \le n$) — the number of pupils, the distance from meeting to the place of excursion, the speed of each pupil, the speed of bus and the number of seats in the bus.

Output

Print the real number — the minimum time in which all pupils can reach the place of excursion. Your answer will be considered correct if its absolute or relative error won't exceed 10^{-6}.

Examples

input
```
5 10 1 2 5
```
output
```
5.0000000000
```

input
```
3 6 1 2 1
```
output
```
4.7142857143
```

Note

In the first sample we should immediately put all five pupils to the bus. The speed of the bus equals 2 and the distance is equal to 10, so the pupils will reach the place of excursion in time $10 / 2 = 5$.

E. Connecting Universities

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Treeland is a country in which there are n towns connected by $n - 1$ two-way road such that it's possible to get from any town to any other town.

In Treeland there are $2k$ universities which are located in different towns.

Recently, the president signed the decree to connect universities by high-speed network.The Ministry of Education understood the decree in its own way and decided that it was enough to connect each university with another one by using a cable. Formally, the decree will be done!

To have the maximum sum in the budget, the Ministry decided to divide universities into pairs so that the total length of the required cable will be maximum. In other words, the total distance between universities in k pairs should be as large as possible.

Help the Ministry to find the maximum total distance. Of course, each university should be present in only one pair. Consider that all roads have the same length which is equal to 1.

Input

The first line of the input contains two integers n and k ($2 \le n \le 200\,000$, $1 \le k \le n / 2$) — the number of towns in Treeland and the number of university pairs. Consider that towns are numbered from 1 to n.

The second line contains $2k$ distinct integers $u_1, u_2, ..., u_{2k}$ ($1 \le u_i \le n$) — indices of towns in which universities are located.

The next $n - 1$ line contains the description of roads. Each line contains the pair of integers x_j and y_j ($1 \le x_j, y_j \le n$), which means that the j-th road connects towns x_j and y_j. All of them are two-way roads. You can move from any town to any other using only these roads.

Output

Print the maximum possible sum of distances in the division of universities into k pairs.

Examples

input

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

output

```
6
```

input

```
9 3
3 2 1 6 5 9
8 9
3 2
2 7
3 4
7 6
4 5
2 1
2 8
```

output

```
9
```

Note

The figure below shows one of possible division into pairs in the first test. If you connect universities number 1 and 6 (marked in red) and universities number 2 and 5 (marked in blue) by using the cable, the total distance will equal 6 which will be the maximum sum in this example.

F. Break Up

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Again, there are hard times in Berland! Many towns have such tensions that even civil war is possible.

There are n towns in Reberland, some pairs of which connected by two-way roads. It is not guaranteed that it is possible to reach one town from any other town using these roads.

Towns s and t announce the final break of any relationship and intend to rule out the possibility of moving between them by the roads. Now possibly it is needed to close several roads so that moving from s to t using roads becomes impossible. Each town agrees to spend money on closing no more than one road, therefore, the total number of closed roads will be **no more than two**.

Help them find set of no more than two roads such that there will be no way between s and t after closing these roads. For each road the budget required for its closure was estimated. Among all sets find such that the total budget for the closure of a set of roads is minimum.

Input

The first line of the input contains two integers n and m ($2 \le n \le 1000$, $0 \le m \le 30\,000$) — the number of towns in Berland and the number of roads.

The second line contains integers s and t ($1 \le s, t \le n$, $s \ne t$) — indices of towns which break up the relationships.

Then follow m lines, each of them contains three integers x_i, y_i and w_i ($1 \le x_i, y_i \le n$, $1 \le w_i \le 10^9$) — indices of towns connected by the i-th road, and the budget on its closure.

All roads are bidirectional. It is allowed that the pair of towns is connected by more than one road. Roads that connect the city to itself are allowed.

Output

In the first line print the minimum budget required to break up the relations between s and t, if it is allowed to close no more than two roads.

In the second line print the value c ($0 \le c \le 2$) — the number of roads to be closed in the found solution.

In the third line print in any order c diverse integers from 1 to m — indices of closed roads. Consider that the roads are numbered from 1 to m in the order they appear in the input.

If it is impossible to make towns s and t disconnected by removing no more than 2 roads, the output should contain a single line `-1`.

If there are several possible answers, you may print any of them.

Examples

input

```
6 7
1 6
2 1 6
2 3 5
3 4 9
4 6 4
4 6 5
4 5 1
3 1 3
```

output

```
8
2
2 7
```

input

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

output

```
9
2
4 5
```

input

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

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

output

```
1
1
2
```

input

```
2 3
1 2
1 2 734458840
1 2 817380027
1 2 304764803
```

output

```
-1
```