█▮ CODEFORCES$^\beta$

🇬🇧 🇷🇺

A. Little Pony and Crystal Mine

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

Twilight Sparkle once got a crystal from the Crystal Mine. A crystal of size n (n is odd; $n > 1$) is an $n \times n$ matrix with a diamond inscribed into it.

You are given an odd integer n. You need to draw a crystal of size n. The diamond cells of the matrix should be represented by character "D". All other cells of the matrix should be represented by character "*". Look at the examples to understand what you need to draw.

Input

The only line contains an integer n ($3 \leq n \leq 101$; n is odd).

Output

Output a crystal of size n.

Sample test(s)

input
3

output
| ```
*D*
DDD
*D*
``` |

input
5

output
| ```
**D**
*DDD*
DDDDD
*DDD*
**D**
``` |

input
7

output
| ```
***D***
**DDD**
*DDDDD*
DDDDDDD
*DDDDD*
**DDD**
***D***
``` |

█▮ CODEFORCES$^\beta$

B. Little Pony and Sort by Shift

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

One day, Twilight Sparkle is interested in how to sort a sequence of integers $a_1, a_2, ..., a_n$ in non-decreasing order. Being a young unicorn, the only operation she can perform is a unit shift. That is, she can move the last element of the sequence to its beginning:

$$a_1, a_2, ..., a_n \rightarrow a_n, a_1, a_2, ..., a_{n-1}.$$

Help Twilight Sparkle to calculate: what is the minimum number of operations that she needs to sort the sequence?

Input

The first line contains an integer n ($2 \le n \le 10^5$). The second line contains n integer numbers $a_1, a_2, ..., a_n$ ($1 \le a_i \le 10^5$).

Output

If it's impossible to sort the sequence output -1. Otherwise output the minimum number of operations Twilight Sparkle needs to sort it.

Sample test(s)

input
2 2 1

output
1

input
3 1 3 2

output
-1

input
2 1 2

output
0

C. Little Pony and Expected Maximum

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

Twilight Sparkle was playing Ludo with her friends Rainbow Dash, Apple Jack and Flutter Shy. But she kept losing. Having returned to the castle, Twilight Sparkle became interested in the dice that were used in the game.

The dice has m faces: the first face of the dice contains a dot, the second one contains two dots, and so on, the m-th face contains m dots. Twilight Sparkle is sure that when the dice is tossed, each face appears with probability $\frac{1}{m}$. Also she knows that each toss is independent from others. Help her to calculate the expected maximum number of dots she could get after tossing the dice n times.

Input

A single line contains two integers m and n ($1 \leq m, n \leq 10^5$).

Output

Output a single real number corresponding to the expected maximum. The answer will be considered correct if its relative or absolute error doesn't exceed 10^{-4}.

Sample test(s)

input
6 1
output
3.500000000000

input
6 3
output
4.958333333333

input
2 2
output
1.750000000000

Note

Consider the third test example. If you've made two tosses:

1. You can get 1 in the first toss, and 2 in the second. Maximum equals to 2.
2. You can get 1 in the first toss, and 1 in the second. Maximum equals to 1.
3. You can get 2 in the first toss, and 1 in the second. Maximum equals to 2.
4. You can get 2 in the first toss, and 2 in the second. Maximum equals to 2.

The probability of each outcome is 0.25, that is expectation equals to:

$$(2 + 1 + 2 + 2) \cdot 0.25 = \tfrac{7}{4}.$$

You can read about expectation using the following link: http://en.wikipedia.org/wiki/Expected_value

D. Little Pony and Harmony Chest

time limit per test: 4 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Princess Twilight went to Celestia and Luna's old castle to research the chest from the Elements of Harmony.

A sequence of positive integers b_i is harmony if and only if for every two elements of the sequence their greatest common divisor equals 1. According to an ancient book, the key of the chest is a harmony sequence b_i which minimizes the following expression:

$$\sum_{i=1}^{n} |a_i - b_i|.$$

You are given sequence a_i, help Princess Twilight to find the key.

Input

The first line contains an integer n ($1 \le n \le 100$) — the number of elements of the sequences a and b. The next line contains n integers $a_1, a_2, ..., a_n$ ($1 \le a_i \le 30$).

Output

Output the key — sequence b_i that minimizes the sum described above. If there are multiple optimal sequences, you can output any of them.

Sample test(s)

input
5 1 1 1 1 1

output
1 1 1 1 1

input
5 1 6 4 2 8

output
1 5 3 1 8

E. Little Pony and Summer Sun Celebration

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

Twilight Sparkle learnt that the evil Nightmare Moon would return during the upcoming Summer Sun Celebration after one thousand years of imprisonment on the moon. She tried to warn her mentor Princess Celestia, but the princess ignored her and sent her to Ponyville to check on the preparations for the celebration.

Twilight Sparkle wanted to track the path of Nightmare Moon. Unfortunately, she didn't know the exact path. What she knew is the parity of the number of times that each place Nightmare Moon visited. Can you help Twilight Sparkle to restore any path that is consistent with this information?

Ponyville can be represented as an undirected graph (vertices are places, edges are roads between places) without self-loops and multi-edges. The path can start and end at any place (also it can be empty). Each place can be visited multiple times. The path must not visit more than $4n$ places.

Input
The first line contains two integers n and m ($2 \le n \le 10^5$; $0 \le m \le 10^5$) — the number of places and the number of roads in Ponyville. Each of the following m lines contains two integers u_i, v_i ($1 \le u_i, v_i \le n$; $u_i \ne v_i$), these integers describe a road between places u_i and v_i.

The next line contains n integers: $x_1, x_2, ..., x_n$ ($0 \le x_i \le 1$) — the parity of the number of times that each place must be visited. If $x_i = 0$, then the i-th place must be visited even number of times, else it must be visited odd number of times.

Output
Output the number of visited places k in the first line ($0 \le k \le 4n$). Then output k integers — the numbers of places in the order of path. If $x_i = 0$, then the i-th place must appear in the path even number of times, else i-th place must appear in the path odd number of times. Note, that given road system has no self-loops, therefore any two neighbouring places in the path must be distinct.

If there is no required path, output -1. If there multiple possible paths, you can output any of them.

Sample test(s)

input
3 2 1 2 2 3 1 1 1

output
3 1 2 3

input
5 7 1 2 1 3 1 4 1 5 3 4 3 5 4 5 0 1 0 1 0

output

```
10
2 1 3 4 5 4 5 4 3 1
```

input

```
2 0
0 0
```

output

```
0
```