ICPC NAQ 2016 I - Primonimo

Time limit: 2.5s **Memory limit:** 1G

ICPC North America Qualifier 2016, Problem I

Primonimo is a game played on an $n \cdot m$ board filled with numbers taken from the range $1 \ldots p$ for some prime number p. At each move, a player selects a square and adds 1 to the numbers in all squares in the same row and column as the selected square. If a square already shows the number p, it wraps around to 1.

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

The game is won if all squares show p. Given an initial board, find a sequence of moves that wins the game!

Input Specification

The input consists of a single test case. The first line contains three numbers n m p denoting the number of rows n $(1 \leq n \leq 20)$, the number of columns m $(1 \leq m \leq 20)$, and a prime number p $(2 \leq p \leq 97)$. Each of the next n lines consists of m numbers in the range $1 \ldots p$.

Output Specification

If a winning sequence of at most $p \cdot m \cdot n$ moves exists, output an integer $k \leq p \cdot m \cdot n$ denoting the number of moves in the sequence. Then output k moves as a sequence of integers that numbers the board in row-major order, starting with 1. If there are multiple such sequences, you may output any one of them. If no winning sequence exists, output `-1`.

Sample Input 1

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

Sample Output 1

```
6
19 12 2 18 5 5
```

Sample Input 2

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

Sample Output 2

```
13
4 2 6 1 9 7 5 5 7 1 2 3 3
```

Sample Input 3

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

Sample Output 3

```
-1
```

Sample Input 4

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

Sample Output 4

```
1
6
```