Codeforces Round #359 (Div. 2)

A. Free Ice Cream

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

After their adventure with the magic mirror Kay and Gerda have returned home and sometimes give free ice cream to kids in the summer.

At the start of the day they have x ice cream packs. Since the ice cream is free, people start standing in the queue before Kay and Gerda's house even in the night. Each person in the queue wants either to take several ice cream packs for himself and his friends or to give several ice cream packs to Kay and Gerda (carriers that bring ice cream have to stand in the same queue).

If a carrier with d ice cream packs comes to the house, then Kay and Gerda take all his packs. If a child who wants to take d ice cream packs comes to the house, then Kay and Gerda will give him d packs if they have enough ice cream, otherwise the child will get no ice cream at all and will leave in distress.

Kay wants to find the amount of ice cream they will have after all people will leave from the queue, and Gerda wants to find the number of distressed kids.

Input

The first line contains two space-separated integers n and x ($1 \le n \le 1000$, $0 \le x \le 10^9$).

Each of the next n lines contains a character '+' or '-', and an integer d_i, separated by a space ($1 \le d_i \le 10^9$). Record "$+ \ d_i$" in i-th line means that a carrier with d_i ice cream packs occupies i-th place from the start of the queue, and record "$- \ d_i$" means that a child who wants to take d_i packs stands in i-th place.

Output

Print two space-separated integers — number of ice cream packs left after all operations, and number of kids that left the house in distress.

Examples

input

```
5 7
+ 5
- 10
- 20
+ 40
- 20
```

output

```
22 1
```

input

```
5 17
- 16
- 2
- 98
+ 100
- 98
```

output

```
3 2
```

Note

Consider the first sample.

1. Initially Kay and Gerda have 7 packs of ice cream.
2. Carrier brings 5 more, so now they have 12 packs.
3. A kid asks for 10 packs and receives them. There are only 2 packs remaining.
4. Another kid asks for 20 packs. Kay and Gerda do not have them, so the kid goes away distressed.
5. Carrier bring 40 packs, now Kay and Gerda have 42 packs.
6. Kid asks for 20 packs and receives them. There are 22 packs remaining.

B. Little Robber Girl's Zoo

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

Little Robber Girl likes to scare animals in her zoo for fun. She decided to arrange the animals in a row in the order of non-decreasing height. However, the animals were so scared that they couldn't stay in the right places.

The robber girl was angry at first, but then she decided to arrange the animals herself. She repeatedly names numbers l and r such that $r - l + 1$ is even. After that animals that occupy positions between l and r inclusively are rearranged as follows: the animal at position l swaps places with the animal at position $l + 1$, the animal $l + 2$ swaps with the animal $l + 3$, ..., finally, the animal at position $r - 1$ swaps with the animal r.

Help the robber girl to arrange the animals in the order of non-decreasing height. You should name at most $20\,000$ segments, since otherwise the robber girl will become bored and will start scaring the animals again.

Input

The first line contains a single integer n $(1 \le n \le 100)$ — number of animals in the robber girl's zoo.

The second line contains n space-separated integers $a_1, a_2, ..., a_n$ $(1 \le a_i \le 10^9)$, where a_i is the height of the animal occupying the i-th place.

Output

Print the sequence of operations that will rearrange the animals by non-decreasing height.

The output should contain several lines, i-th of the lines should contain two space-separated integers l_i and r_i $(1 \le l_i < r_i \le n)$ — descriptions of segments the robber girl should name. The segments should be described in the order the operations are performed.

The number of operations should not exceed $20\,000$.

If the animals are arranged correctly from the start, you are allowed to output nothing.

Examples

input

```
4
2 1 4 3
```

output

```
1 4
```

input

```
7
36 28 57 39 66 69 68
```

output

```
1 4
6 7
```

input

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

output

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

Note

Note that you don't have to minimize the number of operations. Any solution that performs at most $20\,000$ operations is allowed.

C. Robbers' watch

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

Robbers, who attacked the Gerda's cab, are very successful in covering from the kingdom police. To make the goal of catching them even harder, they use their own watches.

First, as they know that kingdom police is bad at math, robbers use the positional numeral system **with base** 7. Second, they divide one day in n hours, and each hour in m minutes. Personal watches of each robber are divided in two parts: first of them has the smallest possible number of places that is necessary to display any integer from 0 to $n - 1$, while the second has the smallest possible number of places that is necessary to display any integer from 0 to $m - 1$. Finally, if some value of hours or minutes can be displayed using less number of places in base 7 than this watches have, the required number of zeroes is added at the beginning of notation.

Note that to display number 0 section of the watches is required to have at least one place.

Little robber wants to know the number of moments of time (particular values of hours and minutes), such that all digits displayed on the watches are **distinct**. Help her calculate this number.

Input

The first line of the input contains two integers, given in the decimal notation, n and m ($1 \le n, m \le 10^9$) — the number of hours in one day and the number of minutes in one hour, respectively.

Output

Print one integer in decimal notation — the number of different pairs of hour and minute, such that all digits displayed on the watches are distinct.

Examples

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

input
```
8 2
```
output
```
5
```

Note

In the first sample, possible pairs are: $(0: 1)$, $(0: 2)$, $(1: 0)$, $(1: 2)$.

In the second sample, possible pairs are: $(02: 1)$, $(03: 1)$, $(04: 1)$, $(05: 1)$, $(06: 1)$.

D. Kay and Snowflake

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

After the piece of a devilish mirror hit the Kay's eye, he is no longer interested in the beauty of the roses. Now he likes to watch snowflakes.

Once upon a time, he found a huge snowflake that has a form of the tree (connected acyclic graph) consisting of n nodes. The root of tree has index 1. Kay is very interested in the structure of this tree.

After doing some research he formed q queries he is interested in. The i-th query asks to find a centroid of the subtree of the node v_i. Your goal is to answer all queries.

Subtree of a node is a part of tree consisting of this node and all it's descendants (direct or not). In other words, subtree of node v is formed by nodes u, such that node v is present on the path from u to root.

Centroid of a tree (or a subtree) is a node, such that if we erase it from the tree, the maximum size of the connected component will be at least two times smaller than the size of the initial tree (or a subtree).

Input

The first line of the input contains two integers n and q ($2 \le n \le 300\,000$, $1 \le q \le 300\,000$) — the size of the initial tree and the number of queries respectively.

The second line contains n - 1 integer $p_2, p_3, ..., p_n$ ($1 \le p_i \le n$) — the indices of the parents of the nodes from 2 to n. Node 1 is a root of the tree. It's guaranteed that p_i define a correct tree.

Each of the following q lines contain a single integer v_i ($1 \le v_i \le n$) — the index of the node, that define the subtree, for which we want to find a centroid.

Output

For each query print the index of a centroid of the corresponding subtree. If there are many suitable nodes, print any of them. It's guaranteed, that each subtree has at least one centroid.

Example

input

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

output

```
3
2
3
6
```

Note

The first query asks for a centroid of the whole tree — this is node 3. If we delete node 3 the tree will split in four components, two of size 1 and two of size 2.

The subtree of the second node consists of this node only, so the answer is 2.

Node 3 is centroid of its own subtree.

The centroids of the subtree of the node 5 are nodes 5 and 6 — both answers are considered correct.

E. Optimal Point

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

When the river brought Gerda to the house of the Old Lady who Knew Magic, this lady decided to make Gerda her daughter. She wants Gerda to forget about Kay, so she puts all the roses from the garden underground.

Mole, who lives in this garden, now can watch the roses without going up to the surface. Typical mole is blind, but this mole was granted as special vision by the Old Lady. He can watch any underground objects on any distance, even through the obstacles and other objects. However, the quality of the picture depends on the Manhattan distance to object being observed.

Mole wants to find an *optimal* point to watch roses, that is such point with **integer coordinates** that the maximum Manhattan distance to the rose is minimum possible.

As usual, he asks you to help.

Manhattan distance between points (x_1, y_1, z_1) and (x_2, y_2, z_2) is defined as $|x_1 - x_2| + |y_1 - y_2| + |z_1 - z_2|$.

Input

The first line of the input contains an integer t t $(1 \le t \le 100\,000)$ — the number of test cases. Then follow exactly t blocks, each containing the description of exactly one test.

The first line of each block contains an integer n_i $(1 \le n_i \le 100\,000)$ — the number of roses in the test. Then follow n_i lines, containing three integers each — the coordinates of the corresponding rose. Note that two or more roses may share the same position.

It's guaranteed that the sum of all n_i doesn't exceed $100\,000$ and all coordinates are not greater than 10^{18} by their absolute value.

Output

For each of t test cases print three integers — the coordinates of the optimal point to watch roses. If there are many optimal answers, print any of them.

The coordinates of the optimal point may coincide with the coordinates of any rose.

Examples

input

```
1
5
0 0 4
0 0 -4
0 4 0
4 0 0
1 1 1
```

output

```
0 0 0
```

input

```
2
1
3 5 9
2
3 5 9
3 5 9
```

output

```
3 5 9
3 5 9
```

Note

In the first sample, the maximum Manhattan distance from the point to the rose is equal to 4.

In the second sample, the maximum possible distance is 0. Note that the positions of the roses may coincide with each other and with the position of the optimal point.