Greetings From Globussoft

- Given below are 5 Programming questions, you have to solve any 3 out of 5 questions.

- These 5 questions you can attempt in any technology like C/C++, java, .Net, PHP

- To solve these 3 questions you've max. 3 hours.

- While Solving these questions you are not allowed to use any **Search Engine** like Google, Yahoo, Bing …

All the best for your test

Globussoft

QUESTION - 1

RK is a great code breaker. He knows any cipher in the world can be broken by frequency analysis. He intercepted an enemy message. The message consists of **N** numbers, smaller than or equal to **C**. RK belives freqency analysis consists of sorting this sequence so that more frequent numbers appear before less frequent ones.

Formally, the sequence must be sorted so that given any two numbers X and Y , X appears before Y if the number of times X appears in the original sequence is larger than the number of time Y does. If the number of appearances is equal, the number whoes value appears sooner in the input should appear sooner in the sorted sequence.
Help RK by creating a "frequency sorter".

INPUT

First line of input contains two integers, N (1<=N<=1000), length of message, and C (1<=C<=10^9), the number from task description. Next line contains N integers smaller than or equal to C, message itself.

OUTPUT

First and only line of output should contain N numbers, the sorted sequence.

SAMPLE

Input
9 3
1 3 3 3 2 2 2 1 1
Output
1 1 1 3 3 3 2 2 2

Input
5 2
2 1 2 1 2
Output
2 2 2 1 1

QUESTION – 2

Alice has received an invitation from Bob to watch some TV on D ($1 \leq D \leq 100$) days! Though spending time with him is nice, she's more concerned about exactly what channels they'll be watching. After all, being a guy, Bob is sure to be interested in viewing less sophisticated programs than she is.

On each day, a different set of N ($1 \leq N \leq 100{,}000$) channels are available, numbered $1..N$. Each channel i has a girliness value of G_i ($0 \leq G_i \leq 10^9$) associated with it, indicating how much Alice would like to watch it. When she arrives at Bob's house, the TV is set to channel 1, but she'd like to surf to a channel with maximal girliness, and as quickly as possible.

Alice wants to be subtle about her channel surfing, however. She believes that Bob may notice if they stay on any channel for less than T ($1 \leq T \leq 1000$) seconds before switching, or if the girliness value of the new channel is more than C ($1 \leq C \leq 10^9$) greater than that of the current one. She needs a plan of action to maximize the girliness of the channel they end up watching, while minimizing the amount of time it'll take her to surf to such a channel.

Input

Line 1: 1 integer, D

For each day:

Line 1: 3 integers, N, C, and T

Line 2: N integers, $G_{1..N}$

Output

For each day:

2 integers, the maximum channel girliness which Alice can surf to, and the minimum number of seconds required to arrive at a channel with this girliness, respectively

Example

```
Input:
2
6 3 5
3 4 0 8 12 6
4 1 2
5 7 7 5
Output:
```

```
8 10
5 0
```

QUESTION – 3

T.E. Lawrence, popularized by the movie *Lawrence of Arabia*, was a British officer during World War I. He is best known for disrupting the railroads of the Ottoman Empire.

For this problem, the railroad of concern runs uninterrupted without branches through several outposts.

```
P ----- P ----- P ----- P
```

Each outpost has a value. The strategic value of a group of connected outposts is the sum of the pairwise products of the outposts. A single outpost

`a`

has no strategic value; two connected outposts

`a`

and

`b`

have strategic value

`a*b`

; three connected outputs

`a`

,

`b`

, and

`c`

have stategic value

`a*b + a*c + b*c`

; and so on.

The total stategic value of the railroad is the sum of the strategic values of these connected groups

Lawrence can attack and destroy a certain number of railroad segments. His goal is to reduce the strategic value of the railroad as much as possible.

For example, consider the following railroad

```
4 ----- 5 ----- 1 ----- 2
```

The stategic value is 4*5 + 4*1 + 4*2 + 5*1 + 5*2 + 1*2, or 49.

Suppose Lawrence has one attack, which is marked by an x.

1. He could attack the left segment.

```
4   x   5 ----- 1 ----- 2
```

The left group has no value, and the right group has value 5*1 + 5*2 + 1*2, for a total of 17.

2. Or he could attack the middle segment.

```
4 ----- 5   x   1 ----- 2
```

The left group has value 4*5, and the right group has value 1*2, for a total of 22.

3. Or he could attack the right segment.

```
4 ----- 5 ----- 1   x   2
```

The left group has value 4*5 + 4*1 + 5*1, and the right group has no value, for a total of 29.

In this case, it would be best for Lawrence to attack the left segment.

Input

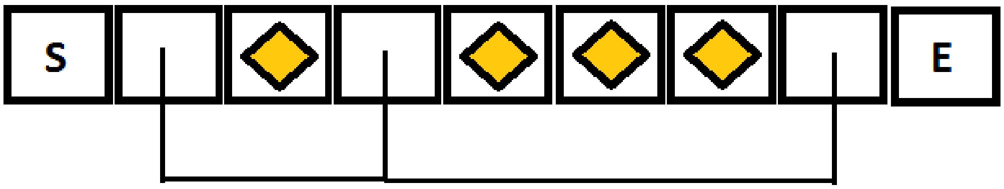
The first line is the number of outposts, 0 < P <= 500.
The second line is the number of railroad segments Lawrence can destroy, 0 <= N < P.
The third line is the space-separated values of the S outposts. Each value is an integer from 0 to 20, inclusive.

Output

The minimum possible stategic value of the railroad after Lawrence's attack.

Input	Input
4 1 4 5 1 2	4 2 4 5 1 2
Output	**Output**
17	2

QUESTION – 4



The race track is a straight line with starting point at Track[0] and ending point at Track[n-1]. The car is initially at Track[0].

Track[i]='#' if the track has a wall at Track[i].

The car can move from Track[i] to Track[i+1] if and only if Track[i+1] is not a wall. The time taken to move from Track[i] to Track[i+1] is 1 unit.

If there is a wall at Track[i+1], you can shoot it from Track[i] if you have enough bullets in the car. Once a bullet is fired, the bullets count will decrease by 1. The time required to fire a bullet is 0.

It is also allowed to ride the car off the track. It's allowed to move from Track[i] to offTrack[i], from offTrack[i] to offTrack[i+1] and from offTrack[i] to Track[i] (if Track[i] is not a wall). The time taken for any of these steps is 2 units.

Find the fastest possible time to finish the race. Print "Impossible" if it's impossible to finish the race.

Input:

The first line consists of an integer t, the number of test cases. For each test case, the first line consists of two integers the length of race track n and the number of bullets the car can fire followed by a line with a string representing the Track.

Output:

For each test case, print the expected result as specified in the problem statement.

Input Constraints:

1 <= t <= 100

2 <= n <= 1000

1 <= bullets <= 1000

Track[i] ∈ {'S','E', '0', '#'}

Track[0]='S', Track[n-1]='E'

Sample Input:

```
10
7 3
S00000E
2 2
SE
4 1
S00E
8 1
S0000##E
8 3
S0#00#0E
7 2
S0#0##E
10 4
S00#0#0##E
5 2
S000E
7 1
S0##00E
9 0
S0000##0E
```

Sample Output:

```
6
1
3
13
7
12
9
4
12
15
```

QUESTION – 5

Given an positive integer n and a sequence $a_1 \ldots a_{n.}$ There are q queries. Each query has one of two formats :

- Format 0 l r k : you need to output the k-th smallest positive integer that can't be partition into a sum of any subsequence of $a_l ... a_r$

- Format 1 l r x : you need to output the numbers of ways to partition x into a sum of a subseqence of $a_l ... a_r$ (or the numbers of subsequence that sum of all its elements equal to x) (modulo 2^{32})

Input :

- Fist line : two positive n and q ($1 \le n \le 100$, $1 \le q \le 10000$)
- Second line : n positive $a_1 \ldots a_n$ ($0 \le a_i \le 100$)
- Next q lines : each line denotes a query with one of two format listed above ($1 \le l \le r \le n$, $1 \le k \le 10^9$, $0 \le x \le 10^9$)

Output :

- q lines : the i-th line is the answer of i-th query.

Sample :

Input :

5 3

1 0 2 4 1

0 2 3 2
1 1 4 0
1 2 5 3

0 2 3 2

1 1 4 0

1 2 5 3

Output :

3