HKUST Local Programming Contest

Oct. 3, 2020

* The problems originate from ZOJ.

A - Problem A ZOJ - 3911

You are given a simple task. Given a sequence $A[i]$ with N numbers. You have to perform Q operations on the given sequence.

Here are the operations:

- A v l, add the value v to element with index l.(1<=V<=1000)
- R a l r, replace all the elements of sequence with index i(l<=i<= r) with a(1<=a<=10^6) .
- Q l r, print the number of elements with index i(l<=i<=r) and $A[i]$ is a prime number

Note that no number in sequence ever will exceed 10^7.

Input

The first line is a signer integer T which is the number of test cases.

For each test case, The first line contains two numbers N and Q (1 <= N, Q <= 100000) - the number of elements in sequence and the number of queries.

The second line contains N numbers - the elements of the sequence.

In next Q lines, each line contains an operation to be performed on the sequence.

Output

For each test case and each query,print the answer in one line.

Sample Input

```
1
5 10
1 2 3 4 5
A 3 1
Q 1 3
R 5 2 4
A 1 1
Q 1 1
Q 1 2
Q 1 4
A 3 5
Q 5 5
Q 1 5
```

Sample Output

```
2
1
2
4
0
4
```

B - Problem B ZOJ - 4011

A sequence of k integers $b_1, b_2, \ldots, b_k$ ($1 \leq b_1 \leq b_2 \leq \ldots \leq b_k \leq n$) is called a happy sequence if each number divides (without a remainder) the next number in the sequence. More formally, we can say $b_i | b_{i+1}$ for all $1 \leq i \leq k-1$, or we can say $b_{i+1} \bmod b_i = 0$ for all $1 \leq i \leq k-1$.

Given n and m, find the number of happy sequences of length m. Two sequences $x_1, x_2, \ldots, x_m$ and $y_1, y_2, \ldots, y_m$ are different, if and only if there exists an i such that $1 \leq i \leq m$ and $x_i \neq y_i$.

As the answer can be rather large print it modulo 1000000007 ($10^9 + 7$).

Input

There are multiple test cases. The first line of the input contains an integer T (about 50), indicating the number of test cases. For each test case:

The first and only line contains two integers n and m ($1 \leq n, m \leq 2000$), indicating the upper limit of the elements in the sequence and the length of the sequence.

Output

For each case output a single integer, indicating the number of happy sequences of length m modulo $10^9 + 7$

Sample Input

```
1
3 2
```

Sample Output

```
5
```

Hint

In the sample test case, the happy sequences are: $[1, 1], [2, 2], [3, 3], [1, 2], [1, 3]$.

C - Problem C ZOJ - 4014

DreamGrid's birthday is coming. As his best friend, BaoBao is going to prepare a gift for him.

As we all know, BaoBao has a lot of matrices. This time he picks an integer matrix with n rows and m columns from his collection, but he thinks it's not pretty enough. On the one hand, he doesn't want to be stingy, but some integers in the matrix seem to be too small. On the other hand, he knows that DreamGrid is not good at algebra and hates large numbers, but some integers in the matrix seem to be too large and are not suitable for a gift to DreamGrid.

Based on the above consideration, BaoBao declares that a matrix is pretty, if the following conditions are satisfied:

1. For every integer a_{ij} in the matrix, $a_{ij} \geq A$.
2. For every integer a_{ij} in the matrix, $a_{ij} \leq B$.

where a_{ij} is the integer located at the i-th row and the j-th column in the matrix, and A and B are two integers chosen by BaoBao.

Given the matrix BaoBao picks, along with the two integers A and B, please help BaoBao change some integers in the matrix (BaoBao can change an integer in the matrix to any integer) so that the matrix becomes a pretty matrix. As changing integers in the matrix is tiring, please tell BaoBao the minimum number of integers in the matrix he has to change to make the matrix pretty.

Input

There are multiple test cases. The first line of input is an integer T (about 100), indicating the number of test cases. For each test case:

The first line contains four integers n, m, A and B. ($1 \leq n, m \leq 100, 1 \leq A, B \leq 10^5$). Their meanings are described above.

For the next n lines, the i-th line contains m integers $a_{i1}, a_{i2}, \ldots, a_{im}$ ($1 \leq a_{ij} \leq 10^5$), representing the original matrix.

Output

For each test case output one line indicating the answer. If it's impossible to make the matrix pretty, print "No Solution" (without quotes) instead.

Sample Input

```
2
3 4 2 3
3 2 2 2
2 1 2 3
2 3 100 3
2 1 2 1
1
2
```

Sample Output

```
2
No Solution
```

D - Problem D ZOJ - 3516

Now we have a tree and some queries to deal with. Every node in the tree has a value on it. For one node *A*, we want to know the largest three values in all the nodes of the subtree whose root is node *A*. Node 0 is root of the tree, except it, all other nodes have a parent node.

Input

There are several test cases. Each test case begins with a line contains one integer $n(1 \le n \le 10000)$, which indicates the number of the node in the tree. The second line contains one integer $v[o]$, the value on the root. Then for the following $n - 1$ lines(from the 3rd line to the (n + 1)th line), let $i + 2$ be the line number, then line $i + 2$ contains two integers *parent* and $v[i]$, here *parent* is node i's parent node, $v[i]$ is the value on node i. Here $0 \le v[i] \le 1000000$. Then the next line contains an integer $m(1 \le m \le 10000)$, which indicates the number of queries. Following m lines, each line contains one integer q, $0 \le q < n$, it meas a query on node q.

Output

For each test case, output m lines, each line contains one or three integers. If the query asked for a node that has less than three nodes in the subtree, output a "-1"; otherwise, output the largest three values in the subtree, from larger to smaller.

Sample Input

```
5
1
0 10
0 5
2 7
2 8
5
0
1
2
3
4
```

Sample Output

```
10 8 7
-1
8 7 5
-1
-1
```

E - Problem E ZOJ - 3499

A median is described as the numeric value separating the higher half of a list, from the lower half. The median of a finite list of numbers can be found by arranging all the elements from lowest value to highest value and picking the middle one. If there is an even number of elements, the median is then defined to be the mean of the two middle values. Now, could you write a program to help to find the median?

Input

There are multiple test cases. The first line of input is an integer $T \approx 100$ indicating the number of test cases.

The first line of each test is an integer $0 < n < 500$ indicating the number of elements. The second line consists of n numbers, the elements of the list, whose absolute values are smaller than 1,000,000.

Output

For each test case, output the median, with 3 decimal digits.

Sample Input

```
3
1
0.0
4
1.0 1000.3 100.2 10.1
5
2.0 3.0 5.0 7.0 11.0
```

Sample Output

```
0.000
55.150
5.000
```

References

- http://en.wikipedia.org/wiki/Median

F - Problem F ZOJ - 3323

It is said that the famous Somali Pirates hate digits. So their QQ passwords never contain any digit. Given some lines of candidate passwords, you are asked to delete all the digits in the passwords and print other characters in their original order. So the Somali Pirates can use them as their QQ passwords^^

Input

There are multiple test cases. The first line of input is an integer T ($T <= 10$) indicating the number of test cases.

Each case contains a line indicating a candidate password. The length of the password is between 1 and 20, inclusive. Besides, the password consists of only digits and English letters.

Output

For each candidate password, delete all the digits and print the remaining characters in a line.

Sample Input

```
2
BeatLA123
1plus1equals1
```

Sample Output

```
BeatLA
plusequals
```

G - Problem G ZOJ - 4096

N letters have just arrived at the post office positioned at $x = 0$, and the i-th letter should be posted to position $x = a_i$. BaoBao, our beloved postman, will start his work from the post office and deliver all these letters by himself.

Unfortunately, BaoBao's backpack can only hold at most K letters each time (which means that if he wants to deliver some letter not in his backpack, he will have to go back to the post office and fetch it), so he may not be able to deliver all N letters in one go. Please note that BaoBao cannot temporarily drop a letter outside the post office and pick it back afterward.

What's the minimum distance BaoBao has to travel to deliver all N letters?

It's NOT necessary that BaoBao ends his delivery in the post office.

Input

There are multiple test cases. The first line of the input contains an integer T, indicating the number of test cases. For each test case:

The first line contains two integers N and K ($1 \leq K \leq N \leq 10^5$), indicating the total number of letters and the capacity of the backpack.

The second line contains N integers $a_1, a_2, \ldots, a_N$ ($-10^9 \leq a_i \leq 10^9$), indicating the destination of each letter.

It's guaranteed that the sum of N over all test cases will not exceed 10^6.

Output

For each test case output one line containing one integer, indicating the minimum distance BaoBao has to travel to deliver all the letters, starting from the post office at $x = 0$.

Sample Input

```
2
5 3
-1 -2 3 -4 -5
6 3
1 0 -2 -1 1 2
```

Sample Output

```
13
6
```

Hint

For the first sample test case, BaoBao can first deliver the 1st and the 3rd letter (go to $x = 3$, then to $x = -1$, then to the post office), then deliver the 2nd, the 4th and the 5th letter (go to $x = -2$, then to $x = -4$, then to $x = -5$), and ends his delivery at $x = -5$.