Codeforces Round #710 (Div. 3)

A. Strange Table

A. Strange Table

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

Polycarp found a rectangular table consisting of n rows and m columns. He noticed that each cell of the table has its number, obtained by the following algorithm **"by columns"**:

- cells are numbered starting from one;
- cells are numbered from left to right by columns, and inside each column from top to bottom;
- number of each cell is an integer one greater than in the previous cell.

For example, if $n = 3$ and $m = 5$, the table will be numbered as follows:

$$\begin{matrix} 1 & 4 & 7 & 10 & 13 \\ 2 & 5 & 8 & 11 & 14 \\ 3 & 6 & 9 & 12 & 15 \end{matrix}$$

However, Polycarp considers such numbering inconvenient. He likes the numbering **"by rows"**:

- cells are numbered starting from one;
- cells are numbered from top to bottom by rows, and inside each row from left to right;
- number of each cell is an integer one greater than the number of the previous cell.

For example, if $n = 3$ and $m = 5$, then Polycarp likes the following table numbering:

$$\begin{matrix} 1 & 2 & 3 & 4 & 5 \\ 6 & 7 & 8 & 9 & 10 \\ 11 & 12 & 13 & 14 & 15 \end{matrix}$$

Polycarp doesn't have much time, so he asks you to find out what would be the cell number in the numbering **"by rows"**, if in the numbering **"by columns"** the cell has the number x?

Input

The first line contains a single integer t ($1 \le t \le 10^4$). Then t test cases follow.

Each test case consists of a single line containing three integers n, m, x ($1 \le n, m \le 10^6$, $1 \le x \le n \cdot m$), where n and m are the number of rows and columns in the table, and x is the cell number.

Note that the numbers in some test cases do not fit into the 32-bit integer type, so you must use at least the 64-bit integer type of your programming language.

Output

For each test case, output the cell number in the numbering **"by rows"**.

Example

input Copy

```
5
1 1 1
2 2 3
3 5 11
100 100 7312
1000000 1000000 1000000000000
```

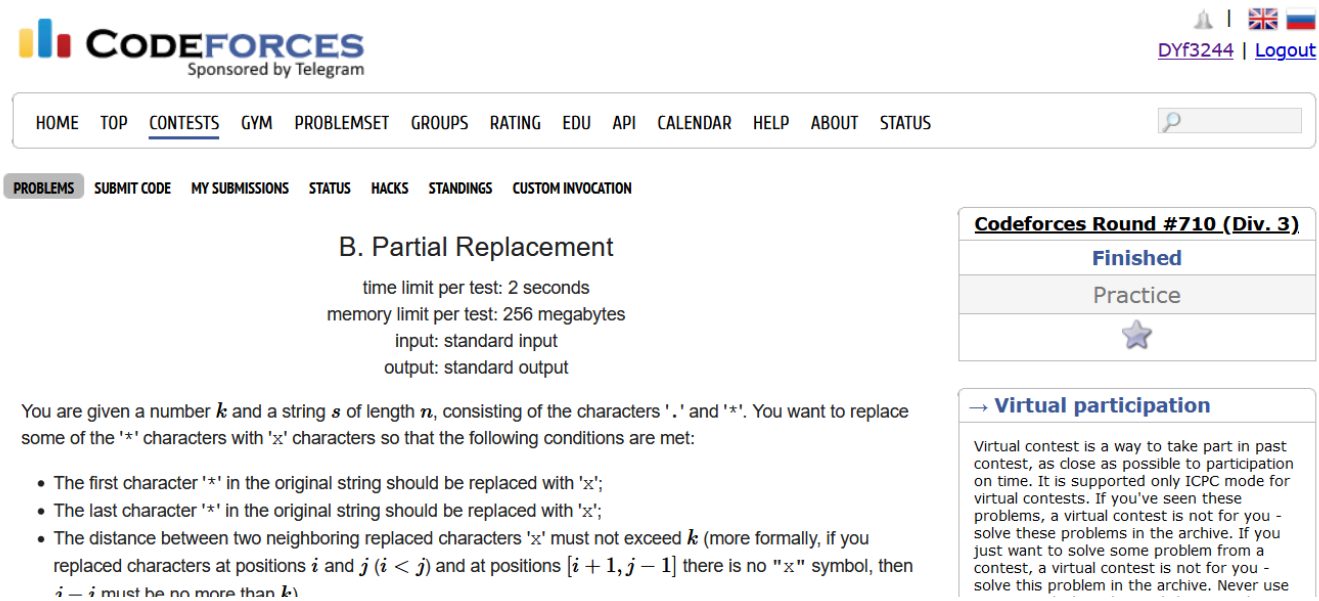
output Copy

```
1
2
9
1174
1000000000000
```

```cpp
#include <bits/stdc++.h>
using namespace std;
#define IOS ios::sync_with_stdio(0)
#define LL long long
#define maxn (int)(2e5 + 10)


LL ans[maxn];
int main ()
{
    IOS;
    int T ; cin >> T;
    for ( int cas = 1 ; cas <= T ; cas++)
    {
        LL n , m , x ;
        cin >> n >> m >> x ;
        LL col = x / n ;
        LL row = x % n ;
        if ( row ) col ++ ;
        if ( !row ) row = n ;
        ans[cas] = ( row - 1 ) * m + col ;
    }
    for ( int i = 1 ; i <= T ; i++ )
        cout << ans[i] << endl;
}
```

B. Partial Replacement



For example, if $n = 7$, $s =$ `.**.***` and $k = 3$, then the following strings will satisfy the conditions above:

- `.xx.*xx`;
- `.x*.x*x`;
- `.xx.xxx`.

But, for example, the following strings will not meet the conditions:

- `.**.*xx` (the first character '*' should be replaced with 'x');
- `.x*.xx*` (the last character '*' should be replaced with 'x');
- `.x*.*xx` (the distance between characters at positions 2 and 6 is greater than $k = 3$).

Given n, k, and s, find the minimum number of '*' characters that must be replaced with 'x' in order to meet the above conditions.

Input

The first line contains one integer t ($1 \le t \le 500$). Then t test cases follow.

The first line of each test case contains two integers n and k ($1 \le k \le n \le 50$).

The second line of each test case contains a string s of length n, consisting of the characters '.' and '*'.

It is guaranteed that there is at least one '*' in the string s.

It is guaranteed that the distance between any two neighboring '*' characters does not exceed k.

Output

For each test case output the minimum number of '*' characters that must be replaced with 'x' characters in order to satisfy the conditions above.

Example

input Copy

```
5
7 3
.**.***
5 1
..*..
5 2
*.*.*
3 2
*.*
1 1
*
```

output Copy

```
3
1
3
2
1
```

someone else's code, read the tutorials or communicate with other person during a virtual contest.

Start virtual contest

→ Practice

You are registered for practice. You can solve problems unofficially. Results can be found in the contest status and in the bottom of standings.

→ Clone Contest to Mashup

You can clone this contest to a mashup.

Clone Contest

→ Submit?

Language: GNU G++11 5.1.0

Choose file: 浏览... 未选择文件。

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→ Last submissions

Submission	Time	Verdict
111123528	Mar/26/2021 13:40	Accepted

→ Problem tags

greedy implementation *1100

No tag edit access

→ Contest materials

- Announcement
- Tutorial


```cpp
#include <bits/stdc++.h>
using namespace std;
#define IOS ios::sync_with_stdio(0)
#define LL long long
#define maxn (int)(2e5 + 10)

int ans[maxn];

int main ()
{
    IOS;
```

```
    int T ; cin >> T;
    for ( int cas = 1 ; cas <= T ; cas++)
    {
        int n , k; cin >> n >> k ;
        string s ; cin >> s;
        vector <int> v;
        for ( int i = 0 ; i < n ; i++ )
            if ( s[i] == '*' )
                v.push_back(i);
        int cnt = 0 ;
        for ( int i = 0 ; i < v.size() ; i++ )
        {
            int x = v[i];
            cnt++;
            while ( i < v.size() && v[i] - x <= k )
                i++;
            if ( i == v.size() ) {
                if ( i != 1 )
                    cnt++ ;
                break;
            }
            i -= 2;
        }
        ans[cas] = cnt;
    }
    for ( int i = 1 ; i <= T ; i++ )
        cout << ans[i] << endl;
}
```

C. Double-ended Strings

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C. Double-ended Strings

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

You are given the strings a and b, consisting of lowercase Latin letters. You can do any number of the following operations in any order:

- if $|a| > 0$ (the length of the string a is greater than zero), delete the first character of the string a, that is, replace a with $a_2a_3 \dots a_n$;
- if $|a| > 0$, delete the last character of the string a, that is, replace a with $a_1a_2 \dots a_{n-1}$;
- if $|b| > 0$ (the length of the string b is greater than zero), delete the first character of the string b, that is, replace b with $b_2b_3 \dots b_n$;
- if $|b| > 0$, delete the last character of the string b, that is, replace b with $b_1b_2 \dots b_{n-1}$.

Note that after each of the operations, the string a or b may become empty.

For example, if $a =$ "hello" and $b =$ "icpc", then you can apply the following sequence of operations:

- delete the first character of the string $a \Rightarrow a =$ "ello" and $b =$ "icpc";
- delete the first character of the string $b \Rightarrow a =$ "ello" and $b =$ "cpc";
- delete the first character of the string $b \Rightarrow a =$ "ello" and $b =$ "pc";

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Finished
Practice

→ Virtual participation

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

Start virtual contest

→ Practice

You are registered for practice. You can solve problems unofficially. Results can be found in

- delete the last character of the string $a \Rightarrow a =$"ell" and $b =$"pc";
- delete the last character of the string $b \Rightarrow a =$"ell" and $b =$"p".

For the given strings a and b, find the minimum number of operations for which you can make the strings a and b equal. Note that empty strings are also equal.

Input
The first line contains a single integer t ($1 \le t \le 100$). Then t test cases follow.

The first line of each test case contains the string a ($1 \le |a| \le 20$), consisting of lowercase Latin letters.

The second line of each test case contains the string b ($1 \le |b| \le 20$), consisting of lowercase Latin letters.

Output
For each test case, output the minimum number of operations that can make the strings a and b equal.

Example

input Copy

```
5
a
a
abcd
bc
hello
codeforces
hello
helo
dhjakjsnasjhfksafasd
adjsnasjhfksvdafdser
```

output Copy

```
0
2
13
3
20
```

the contest status and in the bottom of standings.

→ **Clone Contest to Mashup**

You can clone this contest to a mashup.

Clone Contest

→ **Submit?**

Language: GNU G++11 5.1.0

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→ **Last submissions**

Submission	Time	Verdict
111124489	Mar/26/2021 13:52	Accepted

→ **Problem tags**

brute force dp hashing strings *1000

No tag edit access

→ **Contest materials**

- Announcement
- Tutorial


```cpp
#include <bits/stdc++.h>
using namespace std;
#define IOS ios::sync_with_stdio(0)
#define LL long long
#define maxn (int)(1e6 + 10)

int ans[105];

int main  ()
{
    IOS;
    int T ; cin >> T;
    for ( int cas = 1 ; cas <= T ; cas++)
    {
        string a , b ;
        cin >> a >> b;
        int n = a.length() , m = b.length();
        a = ' ' + a ; b = ' ' + b ;
        int maxx = 0 ;
```

```
        for ( int i = 1 ; i <= n ; i++ )
        {
            for ( int j = 1 ; j <= m ; j++ )
            {
                int cnt = 0 ;
                if ( a[i] != b[j] ) continue;
                int w = i ;
                int k = j ;
                while ( w <= n && k <= m && a[w] == b[k] )
                {
                    cnt++;
                    w++ ; k++;
                }
                maxx = max ( maxx , cnt );
            }
        }
        ans[cas] = n + m - 2*maxx ;
    }
    for ( int i = 1 ; i <= T ; i++ )
        cout << ans[i] << endl;
}
```

D. Epic Transformation

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PROBLEMS SUBMIT CODE MY SUBMISSIONS STATUS HACKS STANDINGS CUSTOM INVOCATION

D. Epic Transformation

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

You are given an array a of length n consisting of integers. You can apply the following operation, consisting of several steps, on the array a **zero** or more times:

- you select two **different** numbers in the array a_i and a_j;
- you remove i-th and j-th elements from the array.

For example, if $n = 6$ and $a = [1, 6, 1, 1, 4, 4]$, then you can perform the following sequence of operations:

- select $i = 1, j = 5$. The array a becomes equal to $[6, 1, 1, 4]$;
- select $i = 1, j = 2$. The array a becomes equal to $[1, 4]$.

What can be the minimum size of the array after applying some sequence of operations to it?

Input

The first line contains a single integer t ($1 \le t \le 10^4$). Then t test cases follow.

The first line of each test case contains a single integer n ($1 \le n \le 2 \cdot 10^5$) is length of the array a.

The second line of each test case contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^9$).

It is guaranteed that the sum of n over all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, output the minimum possible size of the array after applying some sequence of operations to it.

Example

input Copy

```
5
6
```

Codeforces Round #710 (Div. 3)
Finished
Practice

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→ Clone Contest to Mashup

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Clone Contest

→ Submit?

```
1 6 1 1 4 4
2
1 2
2
1 1
5
4 5 4 5 4
6
2 3 2 1 3 1
```

output Copy

```
0
0
2
1
0
```

Language: GNU G++11 5.1.0

Choose file: 浏览... 未选择文件。

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→ **Last submissions**

Submission	Time	Verdict
111133261	Mar/26/2021 15:32	Accepted
111127198	Mar/26/2021 14:25	Wrong answer on test 2
111126454	Mar/26/2021 14:15	Wrong answer on test 2

→ **Problem tags**

constructive algorithms | data structures | greedy | *1400

No tag edit access

→ **Contest materials**

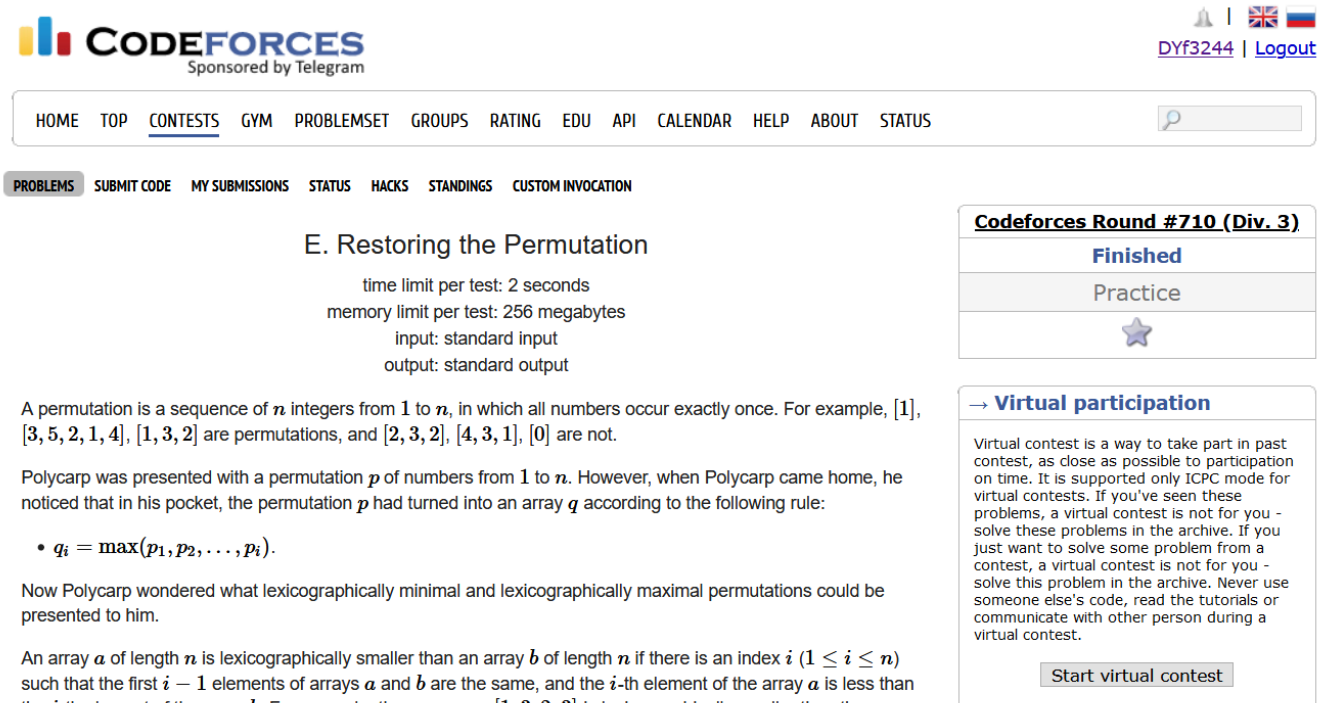
- Announcement
- Tutorial


```cpp
#include <bits/stdc++.h>
using namespace std;
#define IOS ios::sync_with_stdio(0)
#define LL long long
#define maxn (int)(2e5 + 10)


int ans[maxn];
int a[maxn];
int main()
{
    IOS;
    int T ; cin >> T;
    for ( int cas = 1 ; cas <= T ; cas++)
    {
        int n ; cin >> n;
        for ( int i = 1; i <= n ; i++ ) cin >> a[i];
        sort ( a+1 , a+1+n );
        vector<int> v;
        for ( int i = 1; i <= n ; i++ )
        {
            int cnt = 0 ;
            int x = a[i];
```

```
            while ( i <= n && a[i] == x )
            {
                cnt ++;
                i++;
            }
            i--;
            v.push_back(cnt);
        }
        priority_queue<int> q;
        for ( int x : v )
            q.push(x);
        while ( q.size() >= 2 )
        {
            int cnt1 = q.top();
            q.pop();
            int cnt2 = q.top();
            q.pop();
            cnt1-- ; cnt2-- ;
            if ( cnt1 )
                q.push(cnt1);
            if ( cnt2 )
                q.push(cnt2);
        }
        if ( q.empty() )
            ans[cas] = 0 ;
        else
            ans[cas] = q.top();
    }
    for ( int i = 1 ; i <= T ; i++ )
        cout << ans[i] << endl;
}
```

E. Restoring the Permutation



the i-th element of the array b. For example, the array $a = [1, 3, 2, 3]$ is lexicographically smaller than the array $b = [1, 3, 4, 2]$.

For example, if $n = 7$ and $p = [3, 2, 4, 1, 7, 5, 6]$, then $q = [3, 3, 4, 4, 7, 7, 7]$ and the following permutations could have been as p initially:

- $[3, 1, 4, 2, 7, 5, 6]$ (lexicographically minimal permutation);
- $[3, 1, 4, 2, 7, 6, 5]$;
- $[3, 2, 4, 1, 7, 5, 6]$;
- $[3, 2, 4, 1, 7, 6, 5]$ (lexicographically maximum permutation).

For a given array q, find the lexicographically minimal and lexicographically maximal permutations that could have been originally presented to Polycarp.

Input

The first line contains one integer t ($1 \le t \le 10^4$). Then t test cases follow.

The first line of each test case contains one integer n ($1 \le n \le 2 \cdot 10^5$).

The second line of each test case contains n integers $q_1, q_2, \ldots, q_n$ ($1 \le q_i \le n$).

It is guaranteed that the array q was obtained by applying the rule from the statement to some permutation p.

It is guaranteed that the sum of n over all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, output two lines:

- on the first line output n integers — lexicographically **minimal** permutation that could have been originally presented to Polycarp;
- on the second line print n integers — lexicographically **maximal** permutation that could have been originally presented to Polycarp;

Example

input Copy

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

output Copy

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

→ **Practice**

You are registered for practice. You can solve problems unofficially. Results can be found in the contest status and in the bottom of standings.

→ **Clone Contest to Mashup**

You can clone this contest to a mashup.

Clone Contest

→ **Submit?**

Language: GNU G++11 5.1.0

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→ **Last submissions**

Submission	Time	Verdict
111133904	Mar/26/2021 15:39	Accepted
111132247	Mar/26/2021 15:21	Wrong answer on test 2
111130457	Mar/26/2021 15:02	Time limit exceeded on test 10

→ **Problem tags**

constructive algorithms | data structures | dsu | greedy | *1500

No tag edit access

→ **Contest materials**

- Announcement
- Tutorial


```
#include <bits/stdc++.h>
using namespace std;
#define IOS ios::sync_with_stdio(0)
#define LL long long
#define maxn (int)(2e5 + 10)

int T ;
int n ;
int a[maxn];
```

```
vector<int> ans[maxn];
bool Hash[maxn];
void get_min( int cas )
{
    int x = 0 ;
    int cnt = 1 ;
    for ( int i = 1 ; i <= n ; i++ )
    {
        x = a[i];
        if (!Hash[x]) ans[cas].push_back(x) , Hash[x] = 1;
        else
        {
            while (Hash[cnt]) cnt++;
            ans[cas].push_back(cnt++);
        }
    }
}
void get_max ( int cas )
{
    int x = 0 ;
    stack<int> st;
    for ( int i = 1 ; i <= n ; i++ )
    {
        if ( x != a[i] )
        {
            x = a[i];
            if ( x > 1 && !Hash[x-1] )
                st.push(x-1);
            ans[cas].push_back(x);
            Hash[x] = 1;
        }
        else
        {
            int &cnt = st.top();
            Hash[cnt] = 1 ;
            ans[cas].push_back(cnt--);
            if ( Hash[cnt] || cnt == 0 ) st.pop();
        }
    }
}
int main ()
{
    IOS;
    cin >> T;
    for ( int cas = 1 ; cas <= T ; cas++ )
    {
        cin >> n ;
        for ( int i = 1 ; i <= n ; i++ ) cin >> a[i];
        ans[cas].push_back(0);
        memset ( Hash , 0 , sizeof(bool)*(n+5) );
        get_min(cas);
        memset ( Hash , 0 , sizeof(bool)*(n+5) );
        get_max(cas);
    }
```

```
    for ( int i = 1 ; i <= T ; i++ )
    {
        int tmp = (ans[i].size()-1) / 2;
        for ( int j = 1 ; j <= tmp ; j++ )
            cout << ans[i][j] << " ";
        cout << endl;
        for ( int j = tmp+1 ; j <= 2*tmp ; j++ )
            cout << ans[i][j] << " ";
        cout << endl;
    }
}
```