牛客网暑期ACM多校训练营（第四场）

一. 编程题

1. A ternary string is a sequence of digits, where each digit is either 0, 1, or 2.

Chiaki has a ternary string s which can self-reproduce. Every second, a digit 0 is inserted after every 1 in the string, and then a digit 1 is inserted after every 2 in the string, and finally the first character will disappear.

For example, ``212'' will become ``11021'' after one second, and become ``01002110'' after another second.

Chiaki would like to know the number of seconds needed until the string become an empty string. As the answer could be very large, she only needs the answer modulo $(10^9 + 7)$.

输入描述：

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

The first line contains a ternary string s $(1 \leq |s| \leq 10^5)$.

It is guaranteed that the sum of all |s| does not exceed 2×10^6.

输出描述：

For each test case, output an integer denoting the answer. If the string never becomes empty, output -1 instead.

示例1:

输入

3
000
012
22

输出

3
93
45

正确答案：

2. Chiaki has a long interval [1,m] and n small intervals $[l_1, r_1]$, $[l_2, r_2]$, ..., $[l_n, r_n]$. Each small interval $[l_i, r_i]$ is associated with a weight w_i.

Chiaki would to select some small intervals such that:

each integer position $x \in [1, m]$ is covered by at least one small interval.

let s_x be the sum of the weights of all the small intervals covering position x, the maximum value of s_x should be minimum.

输入描述：

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

The first line contains two integers n and m $(1 \leq n, m \leq 2000)$ -- the number of small intervals and the length of the long interval.

Each of the next n lines contains three integers l_i, r_i and w_i $(1 \leq l_i \leq r_i \leq m, 1 \leq w_i \leq 1000)$.

It is guaranteed that the sum of all n does not exceed 20000.

输出描述：

For each test case, output an integer denoting the answer, or -1 if Chiaki cannot select such intervals.

示例1:

输入

2

2 4

1 2 2

3 4 5

1 4

1 3 1

输出

5

-1

正确答案：

3. Chiaki is interested in an infinite sequence $a_1, a_2, a_3, ...$, which defined as follows:

$$a_n = \begin{cases} 0 & n = 1 \\ a_{\lfloor \frac{n}{2} \rfloor} + (-1)^{\frac{n(n+1)}{2}} & n \geq 2 \end{cases}$$

Chiaki would like to know the sum of the first n terms of the sequence, i.e. $\sum_{i=1}^{n} |a_i|$. As this number may be very large, Chiaki is only interested in its remainder modulo ($10^9 + 7$).

输入描述：

There are multiple test cases. The first line of input contains an integer T ($1 \leq T \leq 10^5$), indicating the number of test cases. For each test case:

The first line contains an integer n ($1 \leq n \leq 10^{18}$).

输出描述：

For each test case, output an integer denoting the answer.

示例1:

输入

10

1

2

3

4

5

6

7

8

9

10

输出

0

1

2

2

4

4

6

7
8
11

正确答案：

4. Chiaki has an n x n matrix. She would like to fill each entry by -1, 0 or 1 such that $r_1, r_2, ..., r_n, c_1, c_2, ..., c_n$ are distinct values, where r_i be the sum of the i-th row and c_i be the sum of the i-th column.

输入描述：

There are multiple test cases. The first line of input contains an integer T ($1 \le T \le 200$), indicating the number of test cases. For each test case:

The first line contains an integer n ($1 \le n \le 200$) -- the dimension of the matrix.

输出描述：

For each test case, if no such matrix exists, output ``impossible'' in a single line. Otherwise, output ``possible'' in the first line. And each of the next n lines contains n integers, denoting the solution matrix. If there are multiple solutions, output any of them.

示例1:

输入

2
1
2

输出

impossible
possible
1 0
1 -1

正确答案：

5. There are n points (not necessary distinct) on the plane. Suppose that each point (x_i, y_i) has an associated probability of existence $p_i \in (0, 1]$.

For a point set S={$(x_1, y_1), (x_2, y_2), ..., (x_m, y_m)$}, define F(S) as the number of integer points (x,y) that: there exists at least one index i that $0 < x \le x_i$ and $0 < y \le y_i$.

Chiaki would like to know the expectation of F(S) of the n stochastic points.

输入描述：

There are multiple test cases. The first line of input contains an integer T ($1 \le T \le 200$), indicating the number of test cases. For each test case:

The first line contains an integer n ($1 \le n \le 200$) -- the dimension of the matrix.

输出描述：

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

The first line contains an integer n ($1 \le n \le 10^5$) -- the number of points.

Each of the next n lines contains four integers x_i, y_i, a_i and b_i ($1 \le x_i, y_i \le 10^9$, $1 \le a_i \le b_i \le 10^9$), where

$$p_i = \frac{a_i}{b_i}$$
.

It is guaranteed that the sum of all n does not exceed 10^6.

示例1:

输入

2
3
1 2 1 1
1 2 1 1
1 2 1 1
4
1 2 1 2
1 3 1 2
2 1 1 2
3 1 1 2
输出
2
937500010

正确答案：

6. There's a beautiful garden whose size is n x m in Chiaki's house. The garden can be partitioned into n x m equal-sized square chunks. There are some kinds of flowers planted in each square chunk which can be represented by using lowercase letters.

However, Chiaki thinks the garden is not beautiful enough. Chiaki would like to build a water pool in the garden. So that the garden would look like symmetric (both horizontally and vertically). The water pool is a rectangle whose size is p x q and the center of the water pool is also the center of the garden.

Something else important you should know is:

n, m, p and q are all even.

p is always less than n.

q is always less than m.

The borders of the water pool are parallel to the border of garden.

Chiaki would like to know the number of different pairs of (p, q) she can choose.

输入描述：

There are multiple test cases. The first line of input contains an integer T (1 ≤ T ≤ 100) indicating the number of test cases. For each test case:

The first line contains two integers n and m (1 ≤ n, m ≤ 2000, n and m are even) -- the size of the garden. For next n lines, each line contains m characters showing the garden. It is guaranteed that only lowercase letters will appear.

输出描述：

For each test case, output an integer indicating the number of choices to build the water pool.

示例1：

输入

3
6 8
acbbbbca
dcaccacd
cdaddadc
cdaddadc
dcaccacd
acbbbbca
6 8
acbcbbca

dcaccacd
cdaddadc
cdaddadc
dcaccacd
acbbbbca
6 8
acbbbbca
dcadcacd
cdaddadc
cdaddadc
dcaccacd
acbbbbca
输出
6
0
3

正确答案：

7. The mode of an integer sequence is the value that appears most often. Chiaki has n integers $a_1, a_2, ..., a_n$. She woud like to delete exactly m of them such that: the rest integers have only one mode and the mode is maximum.

输入描述：

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

The first line contains two integers n and m ($1 \le n \le 10^5$, $0 \le m < n$) -- the length of the sequence and the number of integers to delete.

The second line contains n integers $a_1, a_2, ..., a_n$ ($1 \le a_i \le 10^9$) denoting the sequence.

It is guaranteed that the sum of all n does not exceed 10^6.

输出描述：

For each test case, output an integer denoting the answer, or -1 if Chiaki cannot achieve it.

示例1:

输入

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

输出

-1
3
3
3

4

正确答案：

8. Chiaki has a string s. She would like to know the number of (i,j) (1 ≤ i < j ≤ |s|) such that: after swapping s_i and s_j, s can be represented as concatenation of two palindromes.

Note that a string is called palindrome if and only if its characters read the same backward as forward.

输入描述：

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

The first line contains a string s (1 ≤ |s| ≤ 10^5)consisting of lowercase English letters.

It is guaranteed that the sum of all |s| does not exceed 10^6.

输出描述：

For each test case, output an integer denoting the answer.

示例1:

输入

3
abba
aa
baa

输出

4
1
2

正确答案：

9. Chiaki has a special machine which can generate permutations. You can give any restrictions to the machine, it will generate all the permutation under the restrictions .

Chiaki has generated n restrictions and the i-th of them is that the position of a_i should be less than the position of b_i and c_i.

The restrictions generated by Chiaki are somewhat special and the sequence $a_1,a_2,...,a_n$, $b_1,b_2,...,b_n$, $c_1, c_2, ...,$ c_n is a permutation of 1,2,...,3n.

Among all the permutations generated by the machine, Chiaki would like to find one with minimum value.

The value of a permutation $p_1,p_2,...,p_n$ is $\sum_{i=2}^{n} |p_i - p_{i-1}|$.

输入描述：

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

The first line contains an integer n (1 ≤ n ≤ 10^5) -- the number of restrictions.

Each of the next n lines contains three integers a_i, b_i and c_i (1 ≤ a_i, b_i, c_i ≤ 3n) denoting a restriction.

It is guaranteed that the sum of all n does not exceed 10^6.

输出描述：

For each test case, output 3n integers denoting the permutation with minimum value. If there are multiple solutions, you can output any of them.

示例1:

输入

2
1
1 2 3
2
3 4 2
1 6 5
输出
1 2 3
3 2 1 4 5 6

正确答案：

10. Chiaki has just learned hash in today's lesson. A hash function is any function that can be used to map data of arbitrary size to data of fixed size. As a beginner, Chiaki simply chooses a hash table of size n with hash function $h(x) = x \bmod n$.

Unfortunately, the hash function may map two distinct values to the same hash value. For example, when n = 9 we have h(7) = h(16) = 7. It will cause a failure in the procession of insertion. In this case, Chiaki will check whether the next position $(h(x) + 1) \bmod n$ is available or not. This task will not be finished until an available position is found. If we insert {7, 8, 16} into a hash table of size 9, we will finally get {16, -1, -1, -1, -1, -1, -1, 7, 8}. Available positions are marked as -1.

After done all the exercises, Chiaki became curious to the inverse problem. Can we rebuild the insertion sequence from a hash table? If there are multiple available insertion sequences, Chiaki would like to find the smallest one under lexicographical order.

Sequence a_1, a_2, ..., a_n is lexicographically smaller than sequence b_1, b_2, ..., b_n if and only if there exists i (1 ≤ i ≤ n) satisfy that $a_i < b_i$ and $a_j = b_j$ for all 1 ≤ j < i.

输入描述：

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

The first line of each case contains a positive integer n (1 ≤ n ≤ 2 x 10 [5]) -- the length of the hash table.

The second line contains exactly n integers $a_1, a_2, ..., a_n$ (-1 ≤ a_i ≤ 10[9]).

It is guaranteed that the sum of all n does not exceed 2 x 10 [6].

输出描述：

For each case, please output smallest available insertion sequence in a single line. Print an empty line when the available insertion sequence is empty. If there's no such available insertion sequence, just output -1 in a single line.

示例1:
输入
3
9
16 -1 -1 -1 -1 -1 -1 7 8
4
8 5 2 3
10
8 10 -1 -1 34 75 86 55 88 18
输出
7 8 16
2 3 5 8
34 75 86 55 88 18 8 10

正确答案：

正确答案：