

Problem K. 0721 Master

Input file: **standard input**
 Output file: **standard output**
 Time limit: 2 seconds
 Memory limit: 1024 megabytes

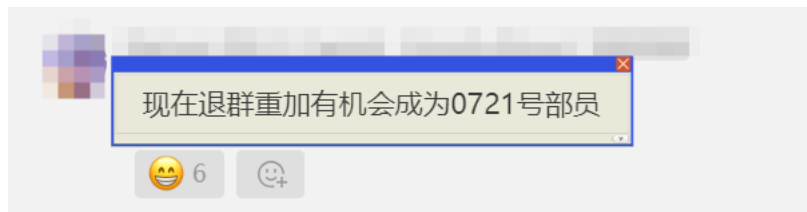
In the ancient times of a distant eastern country, there existed a mysterious QQ group. The people there had a unique custom: they possessed a special “Divine Number” k , and they would worship the group member who had the k -th earliest join time among the current members in the chat. Of course, if the current number of members in the group was strictly less than k , no one would be worshipped.

Now, let us introduce the history of this QQ group. Legend has it that the group was initially empty. Subsequently, n people joined it one after another. Ancient texts recorded the names and the joining order of these n individuals. However, for the sake of the mental health of the contestants participating in this competition, we will simply number these n people from 1 to n **in chronological order** of their joining.

As a QQ group with a long history, its roster of members was by no means static. A person who had joined the group could leave at any arbitrary moment. This could happen before or after any other person joined, or it might never happen at all. However, due to a mysterious rule of the chat group, once a person left, they could never join the group again.

Finally, the ancient texts provide a 01-string S of length n . The i -th character of S is '1' if and only if the member numbered i was worshipped at least at one moment throughout the history of the group chat.

Given n , k , and the string S , can you help us reconstruct a possible history of this group? However, the ancient texts might be flawed. Therefore, if there is no way to reconstruct any valid history, you simply need to tell us that it is impossible.



Picture 1: The ancient text.

Input

Each test contains multiple test cases. The first line contains one integer t ($1 \leq t \leq 5 \times 10^3$), indicating the number of test cases. The description of the test cases follows.

The first line contains two integers n, k ($1 \leq k \leq n$, $1 \leq \sum n \leq 5000$), indicating the number of people and the “Divine Number”.

The second line contains the 01-string S , indicating whether each person was worshipped at least at one moment throughout the history of the group chat.

Output

For each test case, if it is impossible to construct a history that satisfies the conditions, output -1 .

Otherwise, output a positive integer c on the first line, representing the total number of join or leave events. You must ensure that $n \leq c \leq 2n$.

The following c lines describe each event in chronological order. Each line must be one of the following two formats:

- **I x**: denotes that the member numbered x joins the group. You must ensure that member x has never joined the group before this event occurs. Furthermore, after all events are processed, all members numbered $1 \sim n$ must have joined the group at some point.
- **O x**: denotes that the member numbered x leaves the group. You must ensure that member x is currently in the group when this event occurs.

Examples

standard input	standard output
2	6
4 2	I 1
0111	I 2
5 3	I 3
00110	O 1
	I 4
	O 2
	6
	I 1
	I 2
	I 3
	I 4
	O 2
	I 5

Note

For the first test case, the reconstructed history of the group chat proceeds as follows:

- Initially, the group is empty.
- **I 1**: Member 1 joins. The current members are $\{1\}$. Since there is strictly less than $k = 2$ members, no one is worshipped.
- **I 2**: Member 2 joins. The current members are $\{1, 2\}$.
- **I 3**: Member 3 joins. The current members are $\{1, 2, 3\}$.
- **O 1**: Member 1 leaves. The current members are $\{2, 3\}$.
- **I 4**: Member 4 joins. The current members are $\{2, 3, 4\}$.
- **O 2**: Member 2 leaves. The current members are $\{3, 4\}$.

Throughout the history of the group chat, members 2, 3, and 4 were worshipped at least once, while member 1 was never worshipped. So it matches $S = 0111$.