

Problem A. Oshiete oshiete yo sono shikumi wo

Input file: standard input
Output file: standard output
Time limit: 1 second
Memory limit: 256 megabytes

There is only one road and n houses in the Tokyo, and all the houses are on this road. House numbered from 1 to n and appear in this order. There are a_i ghouls living in the i – th house. Due to the RC-cells infection, a $k - 1$ roadblock needs to be installed between houses in Tokyo, so that k blocks of houses are detached. Kaneki Ken wants to divide ghouls so that the maximum number of ghouls over blocks (consecutive houses detached by roadblocks) is minimal. Help Kaneki find this number.

Subtasks

1. (20%) $n \leq 100$
2. (30%) $n \leq 1000$
3. (50%) other tests

Input

The first line contains integers n and k ($1 \leq k \leq n \leq 10^5$). The second line contains the elements of the array a_i ($1 \leq a_i \leq 10^9$).

Output

Print one number - the minimum possible maximum number of ghouls on the section of the roadblock.

Examples

standard input	standard output
10 3 3 4 2 1 3 4 5 2 2 3	12
10 4 3 1 2 4 10 8 4 2 5 3	12
2 1 399265 867718	1266983

Note

In the first example: $(3+4+2+1)$, $(3+4+5)$, $(2+2+3)$

Problem B. Zoro and Seven Sword Style

Input file: **standard input**
Output file: **standard output**
Time limit: **1.5 seconds**
Memory limit: **256 megabytes**

Zoro got lost again, this time in the maze. Walking along a random corridor, he stumbles upon a mysterious door, which says that this is the exit from the maze. The door mechanism works on specific functions for the linked list. But due to the fact that the door is very old, the functions have been erased. Zoro discovered an ancient stone panegyph nearby, which lists about each function:

1. inserts - add a node on position p.
2. remove - remove the node from position p.
3. print - print all values of list separated by a space.
4. replace - move the node from position p1 and to position p2. Position p2 is considered at the moment after its removal.
5. reverse - reverse the entire list.
6. cyclic_left - do a cyclic shift to the left x times.
7. cyclic_right - do a cyclic shift to the right x times.

Also, there are indicated the commands that need to be executed in order for the door to open. It is known that each command calls a specific function. Help Zoro to restore functions.

THE CODE TEMPLATE IS IN THE NOTE BELOW.

Input

Each line of input starts with integer which indicates command:

- If command 0, exit the program.
- If command 1, then the same line of input contains numbers x ($0 \leq x \leq 10^6$) and p ($0 \leq p$). Add a new node with value x to the position p. It is guaranteed that p does not exceed the length of the list.
- If command 2, then the same line of input contains number p ($0 \leq p$). Delete the node from position p. It is guaranteed that p is less than the length of the list.
- If command 3, print the whole list. Print -1 if list is empty.
- If command 4, then the same line of input contains numbers p1 and p2 ($0 \leq p1, p2$). Move node from position p1 to position p2. Position p2 is counted from the moment when we have already retrieved the node from position p1. It is guaranteed that p1 and p2 are less than the length of the list.
- if command 5, reverse whole list.
- If command 6, then the same line of input contains number x. Make left cyclic shift x ($0 \leq x$) times. It is guaranteed that x is less than the length of the list.
- If command 7, then the same line of input contains number x. Make right cyclic shift x ($0 \leq x$) times. It is guaranteed that x is less than the length of the list.

Subtasks

1. (20%) Implement each function in $O(N^2)$ or faster.
2. (20%) Implement functions inserts, remove, print and replace in $O(N)$.
3. (20%) Implement functions inserts, remove, print and reverse in $O(N)$.
4. (20%) Implement functions inserts, remove, print, cyclic_left and cyclic_right in $O(N)$.

Output

For each command print, print all values of list separated by a space.

Note

Each function except print must return the head of the linked list.

CODE TEMPLATES

C++ : <https://pastebin.com/BAG1n8Kp>

Python : <https://pastebin.com/9mwkZnEh>

Java : <https://pastebin.com/jfhpYWYR>

Just leave it to luck

— Roronoa Zoro, *One Piece*

Examples

standard input	standard output
1 0 0 3 1 1 0 3 1 2 2 3 4 0 0 3 4 0 1 3 1 3 2 3 4 2 0 3 4 3 1 3 4 2 3 3 0	0 1 0 1 0 2 1 0 2 0 1 2 0 1 3 2 3 0 1 2 3 2 0 1 3 2 1 0
1 0 0 1 1 1 1 2 2 1 3 3 3 5 3 1 4 0 5 3 0	0 1 2 3 3 2 1 0 0 1 2 3 4
1 0 0 1 1 1 1 2 2 1 3 3 3 7 0 3 7 1 3 6 1 3 6 2 3 1 4 2 3 6 4 3 7 3 3 0	0 1 2 3 0 1 2 3 3 0 1 2 0 1 2 3 2 3 0 1 2 3 4 0 1 1 2 3 4 0 3 4 0 1 2

Problem C. Classroom of the Elite

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 256 megabytes

In class A, students want to establish a class leader. The class split into two factions: Sakayanagi and Katsuragi. They decided to vote with the following rules:

1. Each of n students makes a statement. They make statements one by one starting from students 1 and finishing with student n . If at the moment when it's time for the i – th student to make a statement he no longer has the right to vote, he just skips his turn (and no longer takes part in this voting).
2. When student makes a statement, he can do nothing or declare that one of the other students no longer has a right to vote. It's allowed to deny from voting people who already made the statement or people who are only waiting to do so. If someone is denied from voting he no longer participates in the voting till the very end.
3. When all students are done with their statements, the procedure repeats: again, each student starting from 1 and finishing with n who are still eligible to vote make their statements.
4. The process repeats until there is only one student eligible to vote remaining and he determines the outcome of the whole voting. Of course, he votes for the decision suitable for his fraction.

Input

The first line contains a single integer n ($1 \leq n \leq 200000$) — the number of students in class A. The next line contains n characters. The i – th character is 'S' if the i – th student votes for Sakayanagi or 'K' if votes for Katsuragi.

Subtasks

Problem author doesn't like spending more effort than he has to. Lucky you! Omedetou!

Output

Print the answer without quotes, obviously.

“SAKAYANAGI” — if Sakayanagi will win.

“KATSURAGI” — if Katsuragi will win.

Examples

standard input	standard output
4 KSKS	KATSURAGI
5 SSKKK	SAKAYANAGI

Note

Good Luck!

Problem D. Killua and Hunter exam

Input file: `standard input`
Output file: `standard output`
Time limit: 1 second
Memory limit: 256 megabytes

While Gon is surviving on the Greed Island, Killua, after the first unsuccessful attempt to pass the hunter exam, decides to test himself again. This time one of his tasks is to find the maximum distance between any two vertices in a binary tree. Since Killua is pretty bad at algorithms, he asks for your help.

Input

In the first line you will be given single number N ($1 \leq N \leq 200000$). Next line consists of N numbers, where a_i ($1 \leq a_i \leq 10^9$) represents the i -th number inserted to a binary tree. If a_i was found in a tree, then you don't have to insert it again.

Subtasks

1. (30%) $N \leq 100$.
2. (30%) $N \leq 1000$
3. (40%) No additional constraints.

Output

Print one single number - the maximum distance between any two vertices in a binary tree.

Examples

standard input	standard output
9 11 5 3 2 1 7 9 8 13	7
5 1 2 4 3 5	4
7 4 2 6 5 1 3 7	5

Note

In the first test, the answer is the distance between nodes 1 and 8.

Problem E. Angel Player

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 256 megabytes

Yuri Nakamura conceived a plan to scout the enemy actions. Their enemy is Tenshi, the student council president, who has supernatural powers. However, she's too lazy to divide ~~combatants~~ students in the ~~Shinda Sekai Sensen~~ her organization. Luckily she has a real computer genius on her team — Takeyama. He tries to accomplish his tasks as well as possible. He is so smart that he already has a database (well-composed, btw) of all students and he sees that number of students is divisible by 3. Obviously, in database all students are numbered from 1 to n (inclusive, btw).

His database is so good that there he stores in tables in pairs of people who want work together. It means, that the i - th student wants to be in the team with the j - th and vice versa. Yuri is known to be a very good commander who wants to satisfy everyone's desires, that's why she wants Takiyama to do it for her.

Also, everyone knows that a good team consists of 3 people and everyone follows this condition. So, Yuri said that it is important to divide all students into a team of 3. Help Takeyama divide the students the way Yuri wants.

Input

The first line of the input contains integers n and t ($3 \leq n \leq 66$, $0 \leq t \leq \frac{n \times (n-1)}{2}$) Then follow t lines, each contains a pair of integers a_i, b_i ($1 \leq a_i < b_i \leq n$) — the pair a_i, b_i means that students with numbers a_i and b_i want to be on the same team.

It is guaranteed that n is divisible by 3. It is guaranteed that each pair a_i, b_i occurs in the input at most once.

Output

If the required division into teams doesn't exist, print number -1 . Otherwise, print $\frac{n}{3}$ lines. In each line print three integers x_i, y_i, z_i ($1 \leq x_i, y_i, z_i \leq n$) — the i - th team.

If there are multiple answers, you are allowed to print teams in any order.

Examples

standard input	standard output
6 3 1 2 3 4 2 3	-1
3 1 2 3	2 3 1
6 0	1 2 3 4 5 6

Problem F. Chainsaw Man: 13th generation

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 256 megabytes

After endterm Makima decided to do the problems for the final exam. Do you know what is the hardest thing in making a problem? It is the name of the task.

Makima has a task name draft s . The name of the task must contain a given string as a substring at least k times. But she has a limitation: the name of the task cannot be very long, and she wants to find the shortest one. Help Makima to find the length of the shortest task name satisfying desired condition.

Input

The first line contains a single integer t — the number of testcases. Each of the next t lines contains string s consisting of only lowercase letters and a number k ($1 \leq k \leq 10^6$). The sum of lengths of strings over all test-cases will not exceed $5 * 10^5$

Output

For each test case print answer in separate line.

Examples

standard input	standard output
3 asas 3 aaa 1 b 2	8 3 2
5 anime 666 violetevergarden 898 mononoke 24 evangelion 4 nugman 7	3330 14368 192 40 36