Sliding windows part 1: problems:

1.

ITMO Academy: pilot course » Two Pointers Method » Step 1 » Practice

A. Merging Arrays

time limit per test: 1 second
memory limit per test: 256 megabytes

For educational purposes, in the problems of this block, the time limit is large enough for the solution to pass in $O(n \log n)$ time, but try to write the solution in linear time, which we discussed in the lecture.

You are given two arrays, sorted in non-decreasing order. Merge them into one sorted array.

Input

The first line contains integers n and m, the sizes of the arrays ($1 \le n, m \le 10^5$). The second line contains n integers a_i, elements of the first array, the third line contains m integers b_i, elements of the second array ($-10^9 \le a_i, b_i \le 10^9$).

Output

Print $n + m$ integers, the merged array.

Example

input	Copy
6 7 1 6 9 13 18 18 2 3 8 13 15 21 25	

output	Copy
1 2 3 6 8 9 13 13 15 18 18 21 25	

2.

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B. Number of Smaller

time limit per test: 1 second
memory limit per test: 256 megabytes

You are given two arrays, sorted in non-decreasing order. For each element of the second array, find the number of elements in the first array strictly less than it.

Input

The first line contains integers n and m, the sizes of the arrays ($1 \le n, m \le 10^5$). The second line contains n integers a_i, elements of the first array, the third line contains m integers b_i, elements of the second array ($-10^9 \le a_i, b_i \le 10^9$).

Output

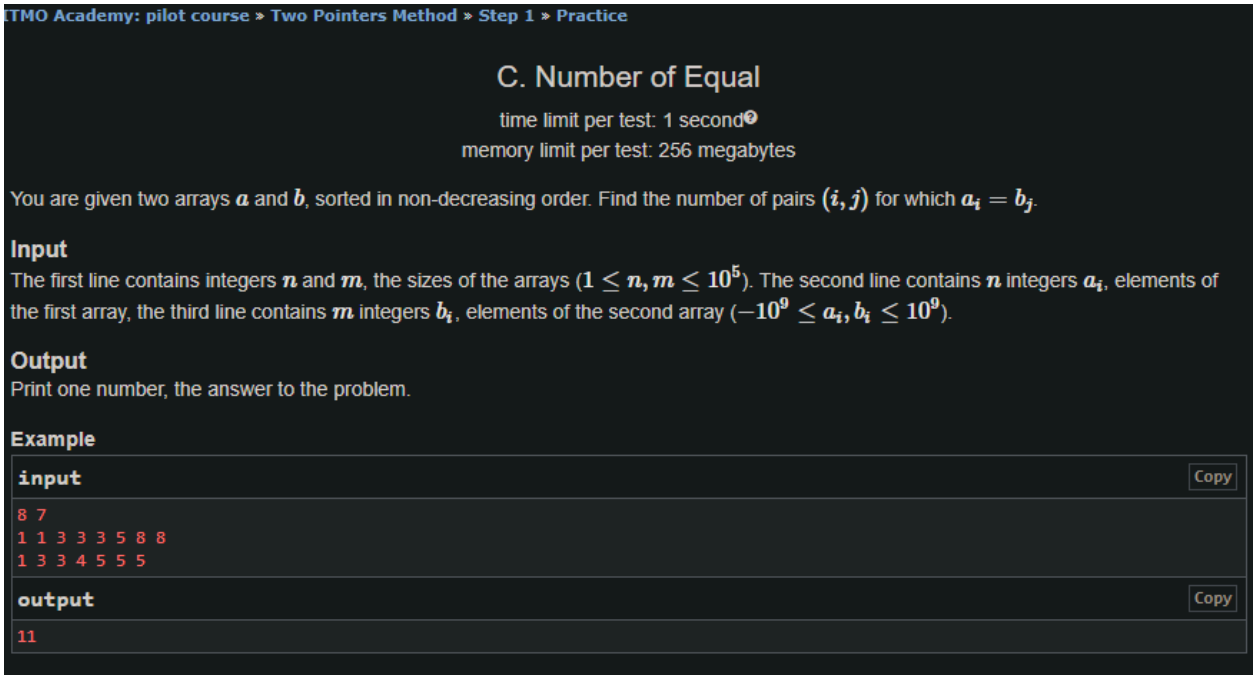
Print m numbers, the number of elements of the first array less than each of the elements of the second array.

Example

input	Copy
6 7 1 6 9 13 18 18 2 3 8 13 15 21 25	

output	Copy
1 1 2 3 4 6 6	

3.



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C. Number of Equal

time limit per test: 1 second
memory limit per test: 256 megabytes

You are given two arrays a and b, sorted in non-decreasing order. Find the number of pairs (i, j) for which $a_i = b_j$.

Input

The first line contains integers n and m, the sizes of the arrays ($1 \le n, m \le 10^5$). The second line contains n integers a_i, elements of the first array, the third line contains m integers b_i, elements of the second array ($-10^9 \le a_i, b_i \le 10^9$).

Output

Print one number, the answer to the problem.

Example

input	Copy
8 7 1 1 3 3 3 5 8 8 1 3 3 4 5 5 5	

output	Copy
11	

4. gfg-Max Sum Subarray of size K

Given an array of integers Arr of size N and a number K. Return the maximum sum of a subarray of size K.
NOTE*: A subarray is a contiguous part of any given array.
Example 1:
Input:
N = 4, K = 2
Arr = [100, 200, 300, 400]
Output:
700
Explanation:
Arr3 + Arr4 =700,
which is maximum.
Example 2:
Input:
N = 4, K = 4
Arr = [100, 200, 300, 400]
Output:
1000
Explanation:
Arr1 + Arr2 + Arr3 + Arr4 =1000,
which is maximum.

Your Task:
You don't need to read input or print anything. Your task is to complete the function maximumSumSubarray() which takes the integer K, vector Arr with size N, containing the elements of the array and returns the maximum sum of a subarray of size K.
Expected Time Complexity: O(N)
Expected Auxiliary Space: O(1)
Constraints:
1 <= N <= 105
1 <= Arri <= 105
1 <= K <= N

5.gfg-First negative in every window of size k

Given an array A[] of size N and a positive integer K, find the first negative integer for each and every window(contiguous subarray) of size K.

Example 1:
Input :
N = 5
A[] = {-8, 2, 3, -6, 10}
K = 2
Output :
-8 0 -6 -6
Explanation :
First negative integer for each window of size k
{-8, 2} = -8
{2, 3} = 0 (does not contain a negative integer)
{3, -6} = -6
{-6, 10} = -6

Example 2:
Input :
N = 8
A[] = {12, -1, -7, 8, -15, 30, 16, 28}
K = 3
Output :
-1 -1 -7 -15 -15 0

Your Task:
You don't need to read input or print anything. Your task is to complete the function

printFirstNegativeInteger() which takes the array A[], its size N and an integer K as inputs and returns the first negative number in every window of size K starting from the first till the end. If a window does not contain a negative integer , then return 0 for that window.

Expected Time Complexity: O(N)
Expected Auxiliary Space: O(K)

Constraints:
1 <= N <= 105
-105 <= A[i] <= 105
1 <= K <= N

6.Count Occurences of Anagrams

Given a word pat and a text txt. Return the count of the occurrences of anagrams of the word in the text.
Example 1:
Input:
txt = forxxorfxdofr
pat = for
Output: 3
Explanation: for, orf and ofr appears
in the txt, hence answer is 3.

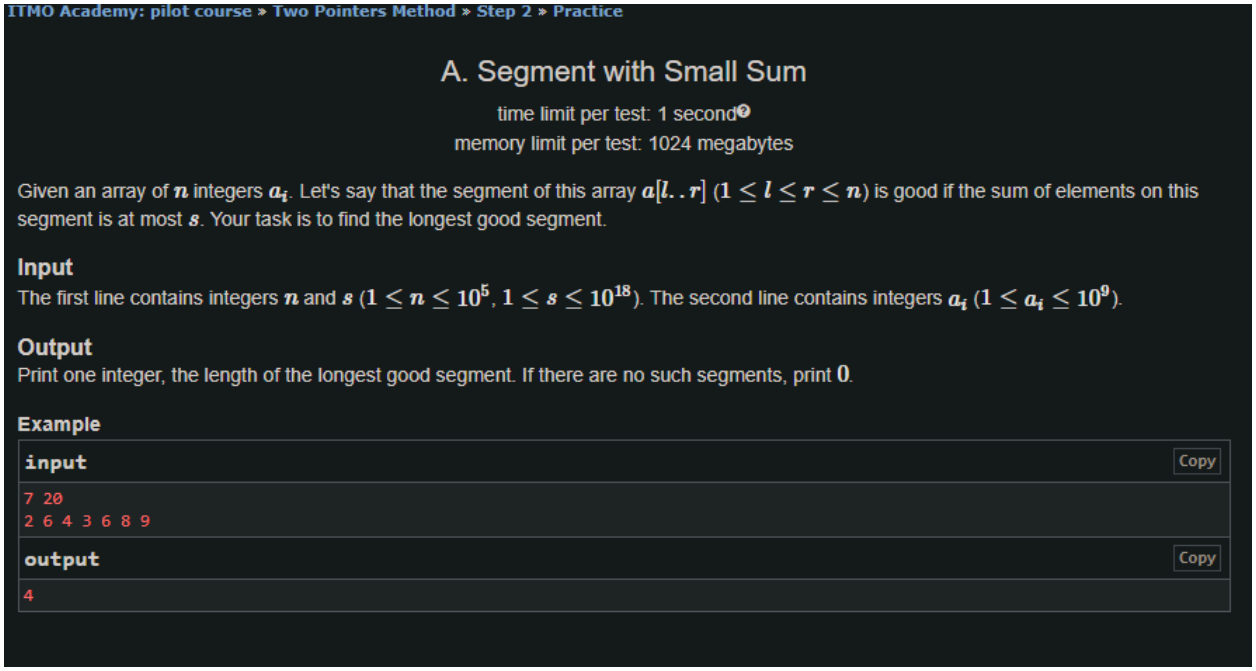
Example 2:
Input:
txt = aabaabaa
pat = aaba
Output: 4
Explanation: aaba is present 4 times
in txt.

Your Task:
Complete the function search() which takes two strings pat, txt, as input parameters and returns an integer denoting the answer.
You don't need to print answer or take inputs.
Expected Time Complexity: O(N)
Expected Auxiliary Space: O(26) or O(256)

Constraints:
1 <= |pat| <= |txt| <= 105
Both strings contain lowercase English letters.

Sliding window part 2: Problems

1.



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A. Segment with Small Sum

time limit per test: 1 second
memory limit per test: 1024 megabytes

Given an array of n integers a_i. Let's say that the segment of this array $a[l..r]$ $(1 \le l \le r \le n)$ is good if the sum of elements on this segment is at most s. Your task is to find the longest good segment.

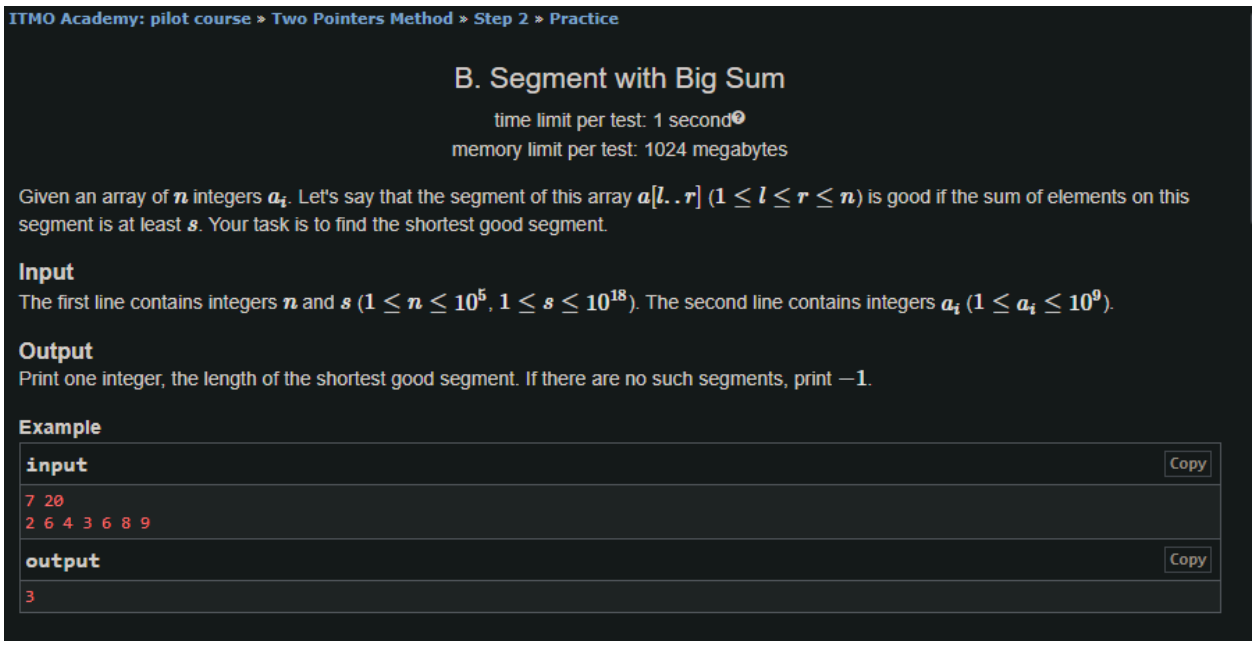
Input
The first line contains integers n and s $(1 \le n \le 10^5, 1 \le s \le 10^{18})$. The second line contains integers a_i $(1 \le a_i \le 10^9)$.

Output
Print one integer, the length of the longest good segment. If there are no such segments, print 0.

Example

input	Copy
7 20 2 6 4 3 6 8 9	
output	**Copy**
4	

2.



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B. Segment with Big Sum

time limit per test: 1 second
memory limit per test: 1024 megabytes

Given an array of n integers a_i. Let's say that the segment of this array $a[l..r]$ $(1 \le l \le r \le n)$ is good if the sum of elements on this segment is at least s. Your task is to find the shortest good segment.

Input
The first line contains integers n and s $(1 \le n \le 10^5, 1 \le s \le 10^{18})$. The second line contains integers a_i $(1 \le a_i \le 10^9)$.

Output
Print one integer, the length of the shortest good segment. If there are no such segments, print -1.

Example

input	Copy
7 20 2 6 4 3 6 8 9	
output	**Copy**
3	

3.

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C. Number of Segments with Small Sum

time limit per test: 1 second
memory limit per test: 1024 megabytes

Given an array of n integers a_i. Let's say that the segment of this array $a[l..r]$ $(1 \le l \le r \le n)$ is good if the sum of elements on this segment is at most s. Your task is to find the number of good segments.

Input

The first line contains integers n and s $(1 \le n \le 10^5, 1 \le s \le 10^{18})$. The second line contains integers a_i $(1 \le a_i \le 10^9)$.

Output

Print one integer, the number of good segments.

Example

input	Copy
7 20 2 6 4 3 6 8 9	
output	**Copy**
19	

4.

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D. Number of Segments with Big Sum

time limit per test: 1 second
memory limit per test: 1024 megabytes

Given an array of n integers a_i. Let's say that the segment of this array $a[l..r]$ $(1 \le l \le r \le n)$ is good if the sum of elements on this segment is at least s. Your task is to find the number of good segments.

Input

The first line contains integers n and s $(1 \le n \le 10^5, 1 \le s \le 10^{18})$. The second line contains integers a_i $(1 \le a_i \le 10^9)$.

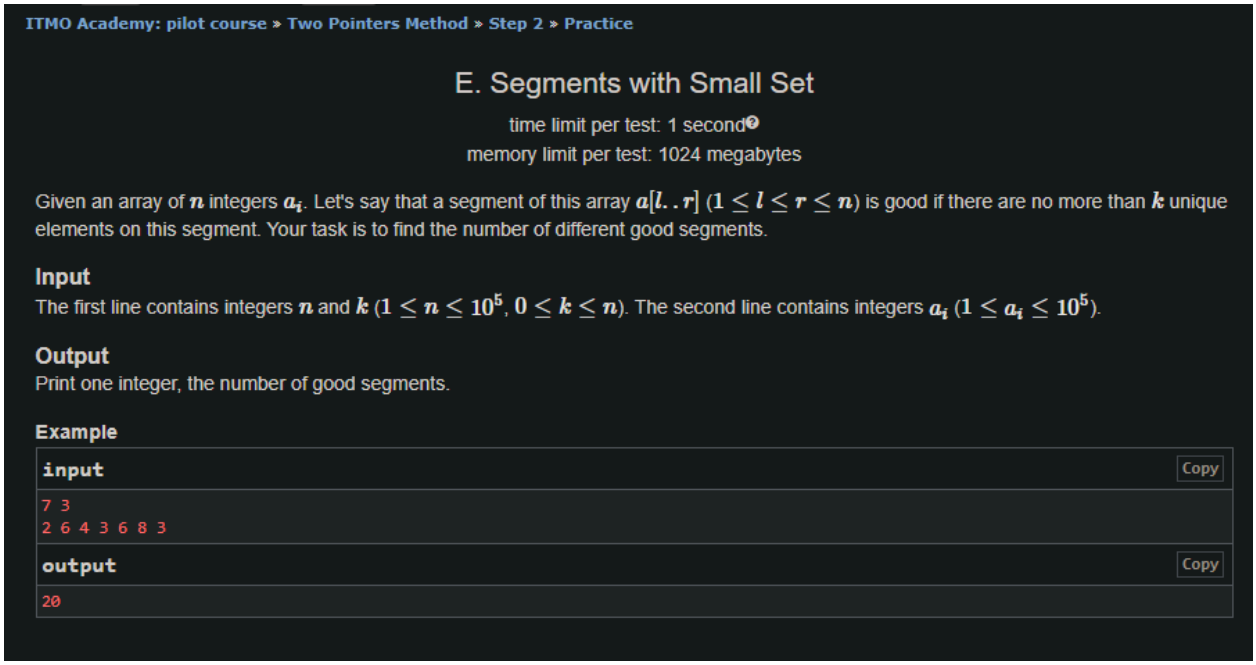
Output

Print one integer, the number of good segments.

Example

input	Copy
7 20 2 6 4 3 6 8 9	
output	**Copy**
9	

5.



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E. Segments with Small Set

time limit per test: 1 second
memory limit per test: 1024 megabytes

Given an array of n integers a_i. Let's say that a segment of this array $a[l..r]$ $(1 \le l \le r \le n)$ is good if there are no more than k unique elements on this segment. Your task is to find the number of different good segments.

Input

The first line contains integers n and k $(1 \le n \le 10^5, 0 \le k \le n)$. The second line contains integers a_i $(1 \le a_i \le 10^5)$.

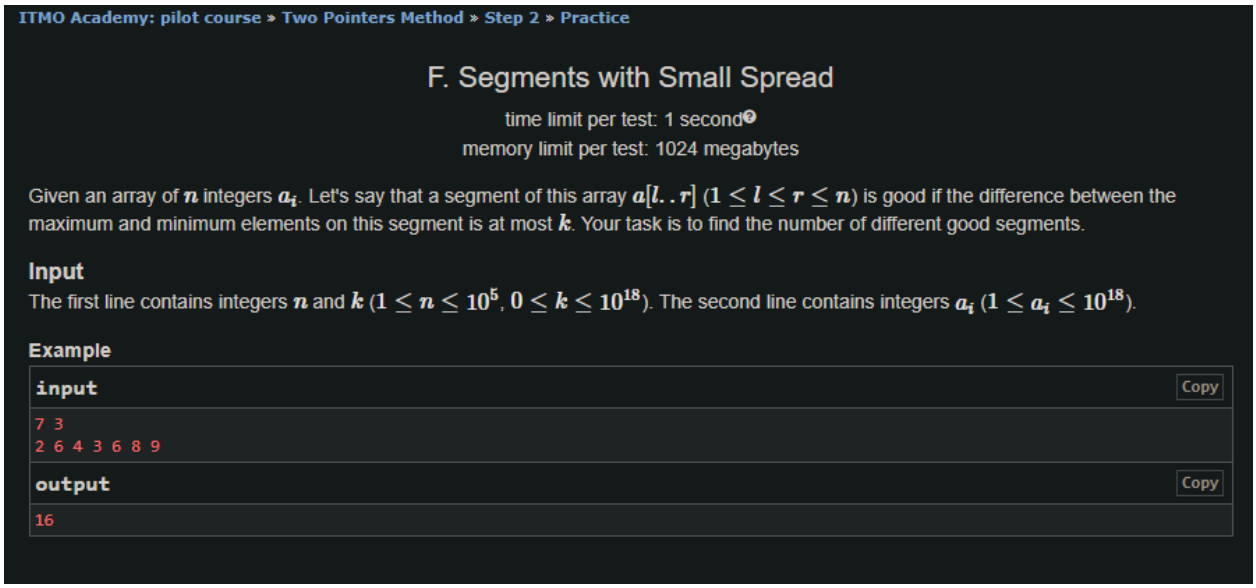
Output

Print one integer, the number of good segments.

Example

input	Copy
7 3 2 6 4 3 6 8 3	
output	**Copy**
20	

6.



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F. Segments with Small Spread

time limit per test: 1 second
memory limit per test: 1024 megabytes

Given an array of n integers a_i. Let's say that a segment of this array $a[l..r]$ $(1 \le l \le r \le n)$ is good if the difference between the maximum and minimum elements on this segment is at most k. Your task is to find the number of different good segments.

Input

The first line contains integers n and k $(1 \le n \le 10^5, 0 \le k \le 10^{18})$. The second line contains integers a_i $(1 \le a_i \le 10^{18})$.

Example

input	Copy
7 3 2 6 4 3 6 8 9	
output	**Copy**
16	

7.Longest K unique characters substring

Given a string you need to print the size of the longest possible substring that has exactly K unique characters. If there is no possible substring then print -1.
Example 1:
Input:
S = "aabacbebebe", K = 3
Output:

7
Explanation:
"cbebebe" is the longest substring with 3 distinct characters.

Example 2:
Input:
S = "aaaa", K = 2
Output: -1
Explanation:
There's no substring with 2 distinct characters.

Your Task:
You don't need to read input or print anything. Your task is to complete the function longestKSubstr() which takes the string S and an integer K as input and returns the length of the longest substring with exactly K distinct characters. If there is no substring with exactly K distinct characters then return -1.
Expected Time Complexity: O(|S|).
Expected Auxiliary Space: O(|S|).
Constraints:
$1 \leq |S| \leq 105$
$1 \leq K \leq 26$
All characters are lowercase latin characters.