

E. Clearing the Snowdrift

time limit per test: 2 seconds

memory limit per test: 1024 megabytes

Boy Vasya loves to travel very much. In particular, flying in airplanes brings him extraordinary pleasure. He was about to fly to another city, but the runway was heavily covered with snow and needed to be cleared.

The runway can be represented as n consecutive sections numbered from 1 to n . The snowstorm was quite strong, but it has already stopped, so Vasya managed to calculate that the i -th section is covered with a_i meters of snow. For such situations, the airport has a snowplow that works in a rather unusual way. In one minute, the snowplow can do the following:

- Choose a consecutive segment of length no more than d and remove one meter of snow from the most snow-covered sections.

Formally, one can choose $1 \leq l \leq r \leq n$ ($r - l + 1 \leq d$). After that,

$c = \max\{a_l, a_{l+1}, \dots, a_r\}$ is calculated, and if $c > 0$, then for all $i: l \leq i \leq r$ such that $a_i = c$, the value of a_i is decreased by one.

Vasya has been preparing for the flight for a long time and wants to understand how much time he has left to wait until all sections are completely cleared of snow. In other words, it is required to calculate the minimum number of minutes that the snowplow will need to achieve $a_i = 0$ for all i from 1 to n .

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 2 \cdot 10^5$). The description of the test cases follows.

The first line of each test case contains two integers n and d ($1 \leq n \leq 5 \cdot 10^5$, $1 \leq d \leq n$) — the number of sections on the runway and the maximum length of the segment that the snowplow can choose.

The second line of each test case contains n integers a_1, a_2, \dots, a_n ($1 \leq a_i \leq 10^9$), where a_i is the number of meters of snow on the i -th section.

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

Output

For each test case, output a single integer — the minimum number of minutes required for the snowplow to achieve $a_i = 0$ for all i from 1 to n .

Example

input	Copy
2	
5 2	
1 5 2 1 2	
3 1	
1000000000 1000000000 1000000000	
output	Copy
8	
3000000000	

Note

In the first test case, there is an optimal sequence of operations. First, select the segment $[2, 3]$ four times. After three operations, a_2 will turn into 2, and the array a will look like $[1, 2, 2, 1, 2]$. After the fourth operation, the array a will become $[1, 1, 1, 1, 2]$. Next, the array can be transformed into zeros by selecting the segments $[1, 2]$, $[3, 3]$, $[5, 5]$, and $[4, 5]$ (in that exact order).

In the second test case, $d = 1$, which means that each section is cleared independently of the others, and the answer is equal to the sum of all a_i .

Codeforces Round 1021 (Div. 1)

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Language: GNU G++23 14.2 (64 bit, ms)

 Choose file: [Choose File](#) No file chosen

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Submission	Time	Verdict
321806094	May/28/2025 18:02	Accepted
321805699	May/28/2025 17:58	Time limit exceeded on test 7
321249571	May/25/2025 16:08	Wrong answer on test 3
321249271	May/25/2025 16:05	Wrong answer on test 3
321249023	May/25/2025 16:03	Time limit exceeded on test 7
321248443	May/25/2025 15:58	Wrong answer on test 3
321248170	May/25/2025 15:56	Wrong answer on test 3
321247931	May/25/2025 15:53	Wrong answer on test 3
321247655	May/25/2025 15:51	Wrong answer on test 3
321247264	May/25/2025 15:48	Wrong answer on test 3



→ Problem tags

[data structures](#) [dfs and similar](#) [dp](#)

greedy *3100

No tag edit access

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