Permutation Counting

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

You have some cards. An integer between 1 and n is written on each card: specifically, for each i from 1 to n, you have a_i cards which have the number i written on them.

There is also a shop which contains unlimited cards of each type. You have k coins, so you can buy k new cards in total, and the cards you buy can contain any integer between 1 and n.

After buying the new cards, you rearrange all your cards in a line. The score of a rearrangement is the number of (contiguous) subarrays of length n which are a permutation of $[1, 2, \ldots, n]$. What's the maximum score you can get?

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \le t \le 100$). The description of the test cases follows.

The first line of each test case contains two integers n, k ($1 \le n \le 2 \cdot 10^5$, $0 \le k \le 10^{12}$) — the number of distinct types of cards and the number of coins.

The second line of each test case contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^{12}$) — the number of cards of type i you have at the beginning.

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 line containing an integer: the maximum score you can get.

Example

standard input	standard output
8 1 10 1 2 4 8 4 3 4 6 1 8 3 9 7 6 2 5 3 6 6 7 4 6 9 7 7 6 1 7 6 2 4 3 3 10 10 1 3 1 2 1 9 3 5 7 5 9 8 5 8 7 5 1 3 2 9 8	11 15 15 22 28 32 28 36

Note

In the first test case, the final (and only) array we can get is $[1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1]$ (including 11 single 1s), which contains 11 subarrays consisting of a permutation of $[1]$.

In the second test case, we can buy 0 cards of type 1 and 4 cards of type 2, and then we rearrange the cards as following: $[1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2]$. There are 8 subarrays equal to $[1, 2]$ and 7 subarrays equal to $[2, 1]$, which make a total of 15 subarrays which are a permutation of $[1, 2]$. It can also be proved that this is the maximum score we can get.

In the third test case, one of the possible optimal rearrangements is $[3, 3, 1, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2, 3, 1, 3]$.