Again Counting Arrays (Hard Version)

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	512 megabytes

This is the hard version of the problem. The differences between the two versions are the constraints on n, m, b_0 and the time limit. You can make hacks only if both versions are solved.

Little R has counted many sets before, and now she decides to count arrays.

Little R thinks an array $b_0, \ldots, b_n$ consisting of non-negative integers is *continuous* if and only if, for each i such that $1 \le i \le n$, $|b_i - b_{i-1}| = 1$ is satisfied. She likes continuity, so she only wants to generate continuous arrays.

If Little R is given b_0 and $a_1, \ldots, a_n$, she will try to generate a non-negative continuous array b, which has no similarity with a. More formally, for all $1 \le i \le n$, $a_i \ne b_i$ holds.

However, Little R does not have any array a. Instead, she gives you n, m and b_0. She wants to count the different integer arrays $a_1, \ldots, a_n$ satisfying:

- $1 \le a_i \le m$;
- At least one non-negative continuous array $b_0, \ldots, b_n$ can be generated.

Note that $b_i \ge 0$, but the b_i can be arbitrarily large.

Since the actual answer may be enormous, please just tell her the answer modulo 998 244 353.

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \le t \le 10^4$). The description of the test cases follows.

The first and only line of each test case contains three integers n, m, and b_0 ($1 \le n \le 2{\cdot}10^6$, $1 \le m \le 2{\cdot}10^6$, $0 \le b_0 \le 2 \cdot 10^6$) — the length of the array $a_1, \ldots, a_n$, the maximum possible element in $a_1, \ldots, a_n$, and the initial element of the array $b_0, \ldots, b_n$.

It is guaranteed that the sum of n over all test cases does not exceeds 10^7.

Output

For each test case, output a single line containing an integer: the number of different arrays $a_1, \ldots, a_n$ satisfying the conditions, modulo 998 244 353.

Example

standard input	standard output
6 3 2 1 5 5 3 13 4 1 100 6 7 100 11 3 1000 424 132	6 3120 59982228 943484039 644081522 501350342

Note

In the first test case, for example, when $a = [1, 2, 1]$, we can set $b = [1, 0, 1, 0]$. When $a = [1, 1, 2]$, we can set $b = [1, 2, 3, 4]$. In total, there are 6 valid choices of $a_1, \ldots, a_n$: in fact, it can be proved that only

$a = [2, 1, 1]$ and $a = [2, 1, 2]$ make it impossible to construct a non-negative continuous $b_0, \ldots, b_n$, so the answer is $2^3 - 2 = 6$.