Problem B. Blueprint for Seating

Time limit: 3 seconds
Memory limit: 1024 megabytes

An aircraft manufacturing company wants to optimize their products for passenger airlines. The company's latest research shows that most of the delays happen because of slow boarding.

Most of the medium-sized aircraft are designed with 3-3 seat layout, meaning each row has 6 seats: 3 seats on the left side, a single aisle, and 3 seats on the right side. At each of the left and right sides there is a window seat, a middle seat, and an aisle seat. A passenger that boards an aircraft assigned to an aisle seat takes significantly less time than a passenger assigned to a window seat even when there is no one else in the aircraft.

The company decided to compute an *inconvenience* of a layout as the total sum of distances from each of the seats of a single row to the closest aisle. The distance from a seat to an aisle is the number of seats between them. For a 3-3 layout, a window seat has a distance of 2, a middle seat — 1, and an aisle seat — 0. The inconvenience of a 3-3 layout is $(2+1+0)+(0+1+2)=6$. The inconvenience of a 3-5-3 layout is $(2+1+0)+(0+1+2+1+0)+(0+1+2)=10$.

Formally, a layout is a sequence of positive integers $a_1, a_2, \ldots, a_{k+1}$ — group i having a_i seats, with k aisles between groups, the i-th aisle being between groups i and $i+1$. This means that in a layout each aisle must always be between two seats, so no aisle can be next to a window, and no two aisles can be next to each other.

The company decided to design a layout with a row of n seats, k aisles and having the minimum inconvenience possible. Help them find the minimum inconvenience among all layouts of n seats and k aisles, and count the number of such layouts modulo 998 244 353.

Input

The first line contains an integer t — the number of test cases you need to solve ($1 \le t \le 10^5$).

For each of the test cases, there is a single line containing n and k — the number of seats, and the number of aisles in a row ($2 \le n \le 10^9$; $1 \le k \le 10^5$; $k < n$).

The total sum of k in all t given test cases does not exceed 10^6.

Output

For each test case print two integers — the minimum inconvenience among all possible layouts, and the number of layouts with the minimum inconvenience modulo 998 244 353.

Example

standard input	standard output
8 4 1 3 2 4 2 5 2 6 1 6 2 1000000000 1 9 2	2 1 0 1 0 1 1 3 6 1 2 4 249999999500000000 1 6 3

Note

In the last test case of `9 2` the possible layouts with the minimum inconvenience of 6 are 3-4-2, 2-4-3, and 2-5-2.