

Task: MOZ Mosaic

ASD lab, credit assignment 1 Available memory: 128 MB. 19.11.2023, 23:59:59

Lately, Byteasar loves to create colorful mosaics from tiles with beautiful shapes. Each tile can have at most k details. It may happen that a tile has 0 details, which means it has no shape at all. However, Byteasar has one important criterion - each tile must be connected to neighboring tiles and cannot differ in the number of details from neighboring tiles by more than one detail. Byteasar believes that mosaics meeting this condition are the most beautiful.

Now we want to find out how many different such most beautiful mosaics of fixed lengths Byteasar can put together, with the caveat that we are only interested in the remainder of dividing by the number 10^9 .

Input

The first line of input gives two integers: n, k ($1 \leq n, k \leq 10^4$), representing, respectively, the number of different lengths of mosaics to check, the maximum number of details per tile.

The next line contains n integers: d_1, d_2, \dots, d_n , from the range $[1, n]$, which denote consecutive Questions about the number of the most beautiful mosaics.

Output

Your program should output n integers separated by a space, denoting the number of most beautiful mosaics modulo 10^9 for successive fixed lengths.

Example

For input:

3 1
1 2 3

Whereas for input data:

8 5
2 3 7 8 6 4 1 5

The correct result is:

2 4 8

The correct result is:

16 44 2658 7442 950 122 6 340

Explanation for example one:

| length d_i | maximum number of details k | the most beautiful mosaics |
|--------------|----------------------------------|--|
| 1 | 1 | (0), (1) |
| 2 | 1 | (0, 0), (0, 1), (1, 0), (1, 1) |
| 3 | 1 | (0, 0, 0), (0, 0, 1), (0, 1, 0), (0, 1, 1), (1, 0, 0), (1, 0, 1), (1, 1, 0), (1, 1, 1) |