Frogs

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

In a very long and narrow pond a mother frog has laid n eggs, the i-th egg at position a_i. From each egg a frog hatches (gets born) in the order from 1 to n. You are also given the jump length k.

At some moment the first p hatched frogs will start playing a game of frog-tag. In this game each frog indefinitely chases its younger sibling, and the youngest chases the oldest (frog i chases frog $i+1$, p chases 1). Every second each frog jumps either left or right by k in the direction of the frog it is chasing; it jumps right if they are on the same position. The frogs from $p+1$ to n do not participate in the game. Formally, for each of the p frogs, simultaneously: if $a_{1+(i \bmod p)} \geq a_i$ then a_i increases by k, otherwise a_i decreases by k.

The mother frog is concerned that her children might move too far away and jump out of the pond. Independently for each p from 2 to n, check if, in the game of frog-tag with frogs $1, 2, \ldots, p$, any one of them will ever move away from its initial position by at least $99^{(99^{99})}$. For each p output `1` if this happens, and `0` otherwise.

Input

The first line contains two integers n and k ($2 \leq n \leq 500\,000$; $1 \leq k \leq 10^9$) denoting the number of eggs and the jump length.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($-10^9 \leq a_i \leq 10^9$) denoting the positions of the eggs.

Output

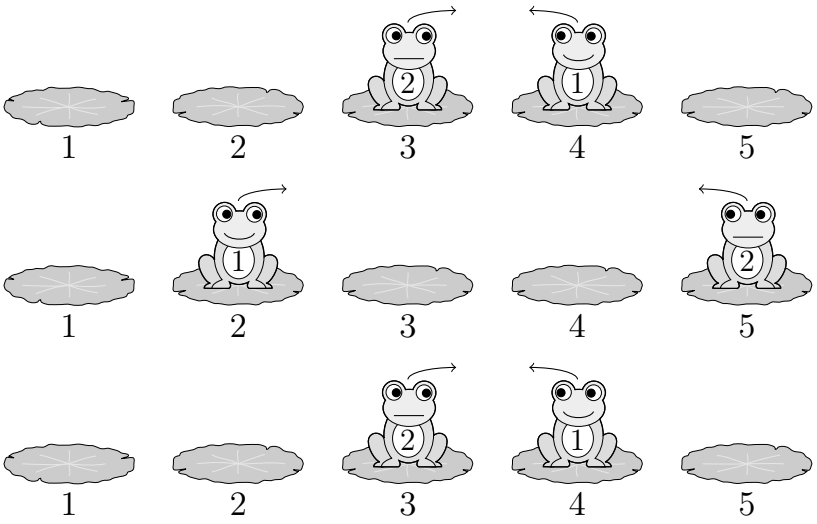
Output the answers for each $p = 2, 3, \ldots, n$ without spaces. If the first p frogs played frog-tag indefinitely, output `1` if any of them would move away from her initial position by at least $99^{(99^{99})}$, or output `0` otherwise. Thus the output should be a binary string of length $n - 1$.

Example

standard input	standard output
6 2 4 3 -3 5 100 100	01011

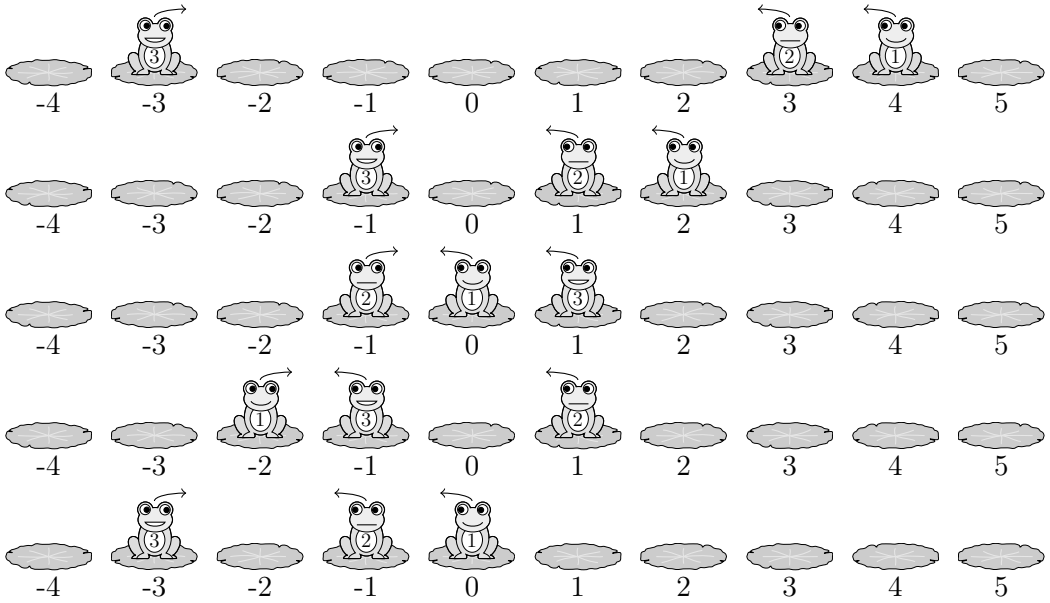
Note

The figures below (see also the second page) show the first few seconds of the frog-tag game for $p = 2, 3, 4$. For $p = 2$ two frogs start at positions 4 and 3, to which they return every 2 seconds. No frog moves very far from its starting position, so the answer is `0`.



Figures for $p = 3$ and $p = 4$ are on the next page!

The first few seconds for $p = 3$, so $a = [4, 3, -3]$. The answer is `1`.



The first few seconds for $p = 4$, so $a = [4, 3, -3, 5]$. The answer is `0`.