# Problem F. Frogs

| | |
|---|---|
| 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

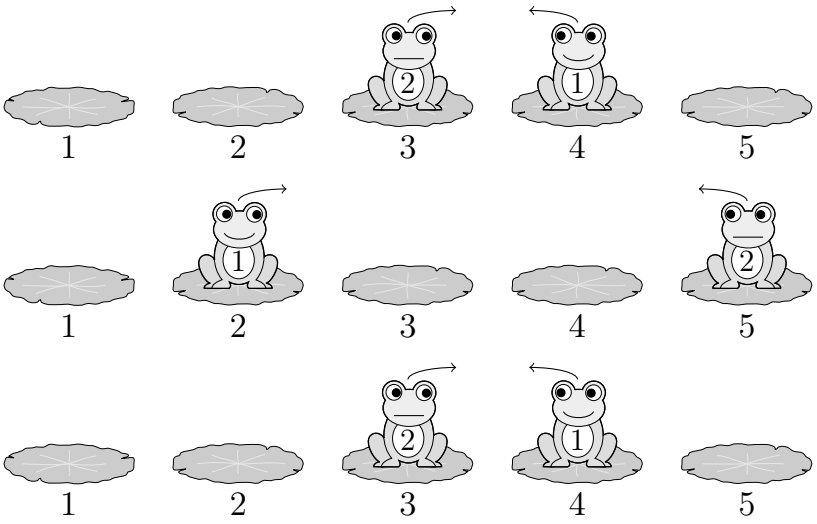
Output the answers for each $p = 2, 3, \ldots, n$ without spaces. If the first $p$ frogs played frog-tag indefinitely, output `1` if any of them would move away from her initial position by at least $99^{(99^{99})}$, or output `0` otherwise. Thus the output should be a binary string of length $n - 1$.

## Example

| standard input | standard output |
|---|---|
| 6 2<br>4 3 -3 5 100 100 | 01011 |

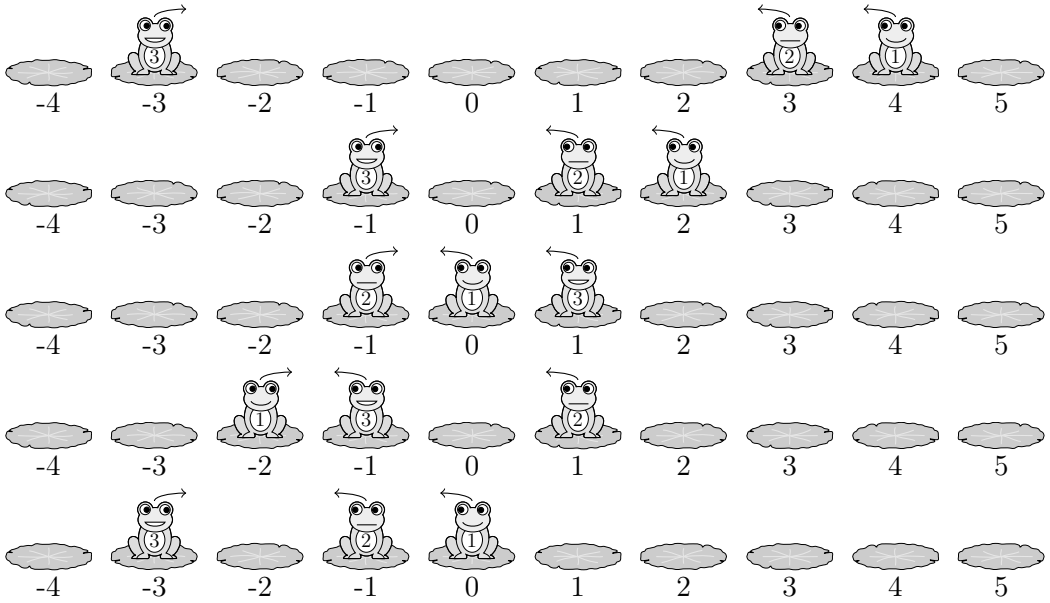
## Note

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`.

