Strange Functions

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Given n functions $f_1(x), f_2(x), \cdots, f_n(x)$, where

$$f_i(x) = \begin{cases} |\arctan(k_i \sec(x - a_i))| & (x \neq a_i + (k + \frac{1}{2})\pi \, (k = 0, \pm 1, \pm 2, \cdots)) \\ \frac{\pi}{2} & (x = a_i + (k + \frac{1}{2})\pi \, (k = 0, \pm 1, \pm 2, \cdots)) \end{cases}$$

For each function $f_i(x)$, determine if there is an x_i that $\forall j \in \{1, 2, \cdots, i-1, i+1, \cdots, n\}, f_i(x_i) < f_j(x_i)$.

Note that:

- "arctan"is the inverse function of "tan".
- $\sec(x) = \frac{1}{\cos(x)}$.

Input

The first line contains one integer $n \, (1 \leq n \leq 10^5)$, denoting the number of given functions.

Following n lines each contains two integers $k_i, a_i \, (1 \leq k_i \leq 10^5, |a_i| \leq 10^5)$, denoting the given functions.

It is guaranteed that $\forall 1 \leq i < j \leq n, \; k_i \neq k_j$ or $a_i \neq a_j$.

Output

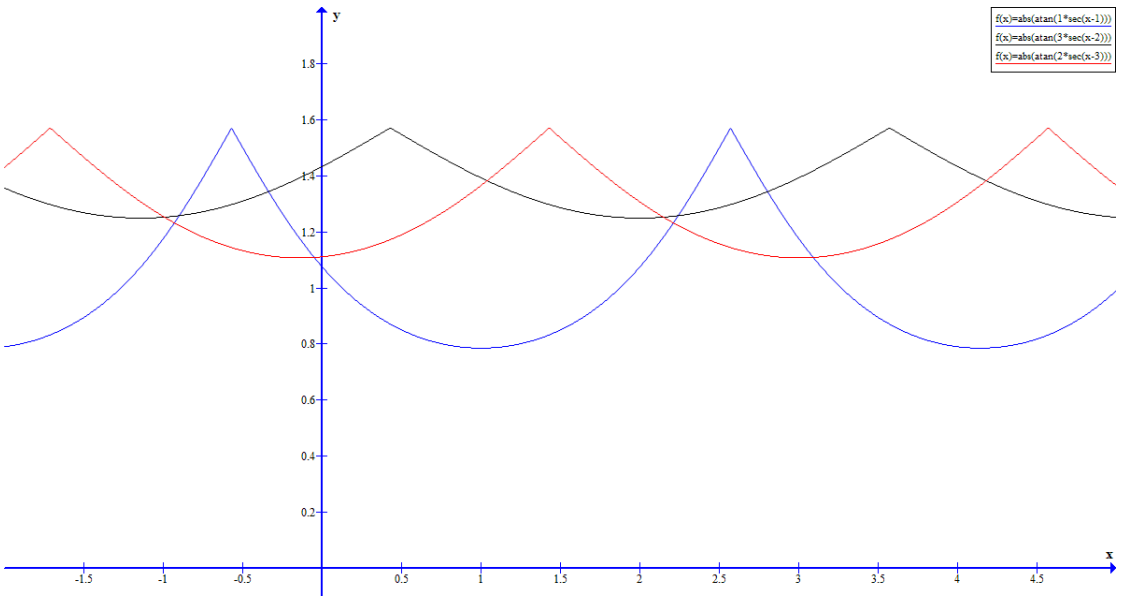
Output one line containing one 01-string S of length n, where $S_i = 1$ iff such x_i exists, or $S_i = 0$.

Example

standard input	standard output
3 1 1 3 2 2 3	101

Note

Here is an illustration for the sample case.


f(x)=abs(atan(1*sec(x-1)))
f(x)=abs(atan(3*sec(x-2)))
f(x)=abs(atan(2*sec(x-3)))
y
x
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
-1.5
-1
-0.5
0.5
1
1.5
2
2.5
3
3.5
4
4.5