D: **Robot Arm**

Source file name: `arm.c`, `arm.cpp`, `arm.java`, *or* `arm.py`
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Two-Dimensional Reacher (RD2) is a robotic arm (distant ancestor of the famous R2D2) that has been used as a welder. Its movements are restricted to two dimensions.

RD2 can be described as a chain of N straight and rigid sections made of very hard metal, $N > 0$, and a joint between each pair of consecutive sections. The free end of the first section is pinned to a point that acts as a shoulder and the free end of the last section acts as a fingertip. The joints between sections allow the arm to be folded at any angle between 0 and 2π (even on itself). The same goes for the shoulder as it also allows the first section to be moved in any direction.

Assuming that the shoulder of RD2 is pinned at the point $(0, 0)$ and that the N sections have lengths $l_1, \ldots, l_N$, the goal is to decide if each point $(x_1, y_1), \cdots, (x_m, y_m)$ in the plane can be touched by RD2's fingertip. For example, if $N = 3$ and RD2 has sections with lengths 2, 5, and 2, respectively, then RD2 can touch the points $(4, 5)$ and $(2, 3)$; however, it cannot touch the points $(0, 0)$ and $(9, 1)$.

Input

The input consists of several test cases. A case begins with a line with two positive integers N and m where N is the number of sections and m the number of points to be touched ($1 \le N \le 10^3$ and $1 \le m \le 10^3$). A line with N integer positive numbers $l_1, \ldots, l_N$ follows, describing the lengths of the sections: l_1 is the length of the first section, l_2 the length of the second section, and so on ($1 \le l_i \le 10^4$). Each of the following m lines contains two blank-separated integer numbers x_i and y_i, defining the coordinates of the ith point to be touched ($-10^7 - 1 \le x_i, y_i \le 10^7 + 1$).

The end of the input is denoted with a line that contains two blank-separated zeroes, which should not be processed.

The input must be read from standard input.

Output

For each case, output m lines, one per point: the i-th line contains 'Y' if RD2 can touch the point (x_i, y_i) and 'N' otherwise.

The output must be written to standard output.

Sample Input	Sample Output
3 4	Y
2 5 2	Y
4 5	N
2 3	N
0 0	N
9 -1	Y
1 2	
10000	
1 800	
10000 0	
0 0	