Given a positive integer n, denote by $[n]$ the interval $\{x : 0 \leq x \leq n\}$ of real numbers. Consider a function $f : [n] \Rightarrow R$. Values of f are provided on a subset S of $[n]$, thereby partially specifying f.

The set S satisfies the following properties:

1. The points in S are all integers.
2. The extremes 0 and n of $[n]$ are both in S.

The function f satisfies the following properties:

- The values of f in the integral points of $[n]$ are integers.
- Between two consecutive points of S, the function is monotonic.
- For each non-integral point x in $[n]$, the value of $f(x)$ is given by the linear interpolation of $f(\lfloor x \rfloor)$ and $f(\lceil x \rceil)$, ie, $f(x) = (x - \lfloor x \rfloor)f(\lfloor x \rfloor) + (\lceil x \rceil - x)f(\lceil x \rceil)$.

We still have the freedom of specifying the values of f in the integral points of $[n] \backslash S$ (note however that S can contain all the integral points of $[n]$). We would like to use this flexibility to make $\int_0^n f(x)dx = y$, i.e., the area under $f(x)$ between the extremes 0 and n equal to y, a given value.

Your problem then is to decide whether this is possible or not.

Input

The input contains several test cases. The first line of a test case contains three integers, N, M and Y, respectively the amplitude of the interval, the size of S and the value of y. Each of the following M lines describes function f at a point of S, containing two integers X and F, representing $f(X) = F$. The values of X are not necessarily in ascending order.

Output

For each test case, determine whether there is a value assignment to $f(x)$ for each integral point $x \in [n] \backslash S$ such that $\int_0^n f(x)dx = y$, i.e. the area under $f(x)$ between the ends 0 and n is equal to y. If not, your program should print a line containing only the character 'N'. If the assignments are possible, your program should print a line containing the character 'S', followed by values of $f(x)$ for the integral points $x \in [n] \backslash S$, in increasing order of the values of x. The initial character and following values, if any, should be separated by a blank space. If more than one solution is possible, then print the lexicographically smallest solution.

Restrictions

- $1 \leq N \leq 10^6$
- $0 \leq X \leq N$, X integer, $\forall X \in S$
- $0 \leq F \leq 10^6$, F integer
- $0 \leq Y \leq 10^9$, Y integer
- $\int_0^n f(x)dx \leq 10^9$ for any assignment of values to $f(x)$ for $x \in [n] \backslash S$ satisfying the stated constraints.

Sample Input

```
5 6 10
0 2
1 2
5 2
2 2
3 2
4 2
5 2 10
0 0
5 10
2 2 5
0 1
2 2
10 3 18
0 2
6 4
10 0
2 2 1
0 0
2 1
```

Sample Output

```
S
S 0 0 0 5
N
S 2 2 2 2 2 1 1 1
N
```