Angie and Functions (Hard)

Time limit: 2.0s **Memory limit:** 256M

Angie is studying functions!

For her homework, she was asked to figure out the coefficients $c_1, c_2, \ldots, c_N, c_{N+1}$ in the following function:

> $f(x) = c_1 x^N + c_2 x^{N-1} + \cdots + c_N x + c_{N+1}$ (All the coefficients are integers)

Angie has $N+1$ arbitrary integer (x, y) coordinate pairs on the polynomial, and wants you to help her find the coefficients.

Can you help her?

Input Specification

The first line of input will be N ($1 \leq N \leq 10^5$), the degree number of the polynomial.

The next $N+1$ lines will each contain a single coordinate pair (x, y) indicating that $f(x) = y$.

The x and y values will be given modulo $77\,309\,411\,329$, and all x values will be unique.

Output Specification

The output should contain $N+1$ integers, the coefficients of the polynomial in descending degree. The coefficients should be output modulo $77\,309\,411\,329$.

Sample Input

```
2
0 0
1 1
2 4
```

Sample Output

```
1 0 0
```