Approximation

Given coordinates (X_i, Y_i) of N points of the plane, calculate the coefficients A, B, C, and D of the polynomial $W(X)=A*X^3 + B*X^2 + C*X + D$, such that value of the function $F(X)=(Y_1 - W(X_1))^2 + (Y_2 - W(X_2))^2 + \ldots + (Y_N - W(X_N))^2$ is minimized.

Input

The first line of input consists of a single positive integer N ($5<=N<=50$), representing the number of points. Each of the following N lines contains the coordinates X_i, Y_i ($-1000<= X_i, Y_i <=1000$), given with two digits precision after the decimal dot.

Output

Output a single line containing the coefficients A, B, C, D of the sought polynomial, separated by spaces. Print all numbers with two digits precision after the decimal dot.

Example

Input:

```
9
    -4.00    -74.00
    -3.00    -26.00
    -2.00      0.00
    -1.00     10.00
     0.00     10.00
     1.00      6.00
     2.00      4.00
     3.00     10.00
     4.00     30.00
```
Output:
```
1.00 -2.00 -3.00 10.00
```

Scoring

For solving this problem you will score 10 points.