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 $F(X)=(Y_1 – W(X_1))^2 + (Y_2 – W(X_2))^2 + … + (Y_N – W(X_N))^2$ 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.