

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 $F(X)=(Y_1 - W(X_1))^2 + (Y_2 - W(X_2))^2 + \dots + (Y_N - W(X_N))^2$ is minimized.

Input

The first line of input consists of a single positive integer N ($5 \leq N \leq 50$), representing the number of points. Each of the following N lines contains the coordinates X_i, Y_i ($-1000 \leq X_i, Y_i \leq 1000$), 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.