Samantha and Portfolio Management

PMF is a Portfolio Management Firm which invests client's money in different types of assets like equities, bonds & fixed deposits. The decision to invest is driven by the client's objective and their risk tolerance. The goal of investment being – maximizing the return.

Samantha is a successful Fund manager at PMF, who invests in n assets:

- Each of the assets are non-correlated.
- The expected rate of the return of i^{th} asset is $\bar{r}_i$.
- The variance of the return of i^{th} asset is $\sigma_i^2 = \frac{1}{i}$.

She is studying the portfolio of these n assets and i^{th} has a weight w_i in the portfolio. The expected rate of the return of the portfolio is E and the variance of the return of the portfolio is V:

$$E = \sum_{i=1}^{n} (w_i \times \bar{r}_i)$$

$$V = \sum_{i=1}^{n} \left(w_i^2 \times \sigma_i^2\right)$$

Help her to decide the weights of the assets, such that:

- w_i is real number, and $0 \leq w_i \leq 1$
- $\sum w_i = 1$
- The value of V is possible minimum.

Input Format

The first line of the input is n, total number of assets. Each of the next n lines contains a single integer $\bar{r}_i$, denoting the expected rate of the return of i^{th} asset.

Constraints

- $2 \leq n \leq 10^4$
- $1 \leq \bar{r}_i \leq 10^2$

Output Format

Output exactly two lines:

- The first line of the output is the value of the expected rate of the return of the portfolio, E in the form of $\frac{P}{Q}$, where P and Q are co-prime integers. So you have to output two space separated integers P and Q.
- The second line of the output is the possible minimum value of the variance of the return of the

portfolio, V in the form of $\frac{P}{Q}$, where P and Q are co-prime integers. So you have to output two space separated integers P and Q.

Sample Input

```
2
1
2
```

Sample Output

```
5 3
1 3
```

Explanation

We have $\bar{r}_1 = 1$ and $\bar{r}_2 = 2$. Lets assume the weights of the assets are w and $(1 - w)$ respectively.

The expected rate of the return of the portfolio, E:

$$E = \sum_{i=1}^{n} (w_i \times \bar{r}_i)$$

$$\Rightarrow E = w \times 1 + (1 - w) \times 2 = 2 - w$$

The variance of the return of the portfolio, V:

$$V = \sum_{i=1}^{n} \left(w_i^2 \times \sigma_i^2\right)$$

$$\Rightarrow V = w^2 + \frac{(1-w)^2}{2}$$

$$\Rightarrow V = \frac{3w^2 - 2w + 1}{2}$$

Now we can see that the value is V is minimized when $w = \frac{1}{3}$. So the possible minimum value of V is $\frac{1}{3}$. Also, the value of E is $\frac{5}{3}$.

So,

- The first line of the output is *5 3*.
- The second line of the output is *1 3*.