Problem D. Lunch Combo Ranking

Time limit 2000 ms
Memory limit 1024MB

Problem Description

At NYCU, the campus cafeteria offers n dishes. Each dish has a taste score w_i (which can be positive if it is delicious, or negative if it is disappointing).

The cafeteria provides two kinds of lunch options:

- Single-dish lunch: Choose exactly one dish, with taste score equal to w_i.
- Combo lunch: Choose two different dishes, with taste score equal to the average of the two, i.e. $\frac{w_i+w_j}{2}$.

In total, there are $n + \binom{n}{2} = \frac{n(n+1)}{2}$ possible lunches.

The student council decides to rank all lunches by their taste score from smallest to largest.

They want to know: what is the k-th largest taste score?

Note: If two lunches have the same taste score, they are still treated as separate entries in the ranking.

Input format

The first line contains two integers n and k ($1 \le n \le 2 \times 10^5$, $1 \le k \le \frac{n(n+1)}{2}$), the number of dishes and the ranking index to query.

The second line contains n integers $w_1, w_2, \ldots, w_n$ ($-10^9 \le w_i \le 10^9$), where w_i is the taste score of the i-th dish.

Output format

Print two integers p and q on separate lines, representing the k-th largest taste score in irreducible fraction form $\frac{p}{q}$.

- p must be an integer.
- q must be a positive integer.
- $|p|$ and q must be coprime.

Subtask score

Subtask	Score	Additional Constraints
1	8	$n \leq 20$
2	12	$n \leq 10^4$ and $k \leq 2 \times 10^5$
3	24	$-100 \leq w_i \leq 100$
4	56	No additional constraints

Sample

Sample Input 1

```
3 3
8 -4 2
```

Sample Output 1

```
2
1
```

Sample Input 2

```
3 4
8 -4 2
```

Sample Output 2

```
2
1
```

Sample Input 3

```
9 23
1 4 -5 6 -7 3 -9 2 8
```

Sample Output 3

```
1
2
```