Partition AND/OR Aggregation

Input file:	`standard input`
Output file:	`standard output`
Time limit:	5 seconds
Memory limit:	1024 megabytes

You are given a sequence of positive integers $(A_1, \ldots, A_N)$ of length N. Consider partitioning this sequence A into M contiguous non-empty subsequences $B_1, B_2, \ldots, B_M$.

For a subsequence $B = (A_L, \ldots, A_R)$, define its **score** by

$$S(B) = \frac{A_L \text{ and } A_{L+1} \text{ and } \cdots \text{ and } A_R}{A_L \text{ or } A_{L+1} \text{ or } \cdots \text{ or } A_R}$$

where $x \text{ and } y$ and $x \text{ or } y$ denote the bitwise AND and bitwise OR of x and y, respectively.

Once a partition is fixed, we obtain M values $S(B_1), \ldots, S(B_M)$ as the scores of the subsequences. Sort these values in **descending** order, and define the score of the partition as the K-th value in that order. Considering all possible partitions, find the maximum and minimum possible values of the partition score.

Input

The first line contains integers N, M, K in this order. $(1 \leq K \leq M \leq N \leq 10^5)$

The second line contains N integers $A_1, \ldots, A_N$ in this order. $(1 \leq A_i < 2^{30}$ $(1 \leq i \leq N))$

Output

Print 2 lines.

Let the maximum and minimum values be $\frac{p}{q}$, $\frac{r}{s}$, respectively, where $p, r \geq 0$, $q, s \geq 1$, $\gcd(p, q) = \gcd(r, s) = 1$. Print p, q on the first line, and r, s on the second line, separated by spaces, in this order.

Examples

standard input	standard output
5 3 3 6 5 7 3 2	2 3 1 7
5 1 1 3 1 4 1 5	0 1 0 1
9 5 3 998 244 353 469 762 49 754 974 721	1 1 208 1023

Note

For the first example, if we choose $B_1 = (6)$, $B_2 = (5, 7)$, $B_3 = (3, 2)$, then $S(B_1) = 1$, $S(B_2) = \frac{5}{7}$, $S(B_3) = \frac{2}{3}$. When these are sorted in descending order, the 3-rd value is $\frac{2}{3}$.

Also, if we choose $B_1 = (6)$, $B_2 = (5, 7, 3)$, $B_3 = (2)$, then $S(B_1) = 1$, $S(B_2) = \frac{1}{7}, S(B_3) = 1$. When these are sorted in descending order, the 3-rd value is $\frac{1}{7}$.

The bitwise AND $x \text{ and } y$ and bitwise OR $x \text{ or } y$ of non-negative integers x, y are defined as follows.

- In the binary representation of $x \text{ and } y$, the digit at the 2^k $(k \geq 0)$ place is 1 if and only if the digits at the 2^k place in the binary representations of both x and y are 1; otherwise, it is 0.
- In the binary representation of $x \text{ or } y$, the digit at the 2^k $(k \geq 0)$ place is 1 if and only if at least one of the digits at the 2^k place in the binary representations of x and y is 1; otherwise, it is 0.

For example, $3 \text{ and } 5 = 1,\ 3 \text{ or } 5 = 7$ (in binary, $011 \text{ and } 101 = 1,\ 011 \text{ or } 101 = 111$).