Maximal AND Subsequences

Alice has an array of n long integers, $A = [a_0, a_1, \ldots, a_{n-1}]$. She wants to find all the k-element subsequences of A where the bitwise AND of the subsequence's elements is maximal.

For example, let $A = [6, 3, 7, 4]$ and $k = 3$. Now, let's apply the *AND* operation on all possible subsequences of size k:

Subsequences	Decimal	Binary
{6, 3 ,7}	6 & 3 & 7 = 2	110 & 011 & 111 = 010
{6, 7, 4}	**6 & 7 & 4 = 4**	**110 & 111 & 100 = 100**
{6, 3 ,4}	6 & 3 & 4 = 0	110 & 011 & 100 = 000
{3, 7, 4}	3 & 7 & 4 = 0	011 & 111 & 100 = 000

The maximal *AND* value of these subsequences is 4, and only 1 subsequence has that value: $\{6, 7, 4\}$.

Given A and k, find the maximal *bitwise AND* value of any subsequence of A, as well as the total number of subsequences having that maximal value modulo $10^9 + 7$.

Input Format

The first line contains two space-separated integers describing the respective values of n (the number of elements in the array) and k (the size of the subsequence).
Each of the n subsequent line contains a long integer describing the respective values of $a_0, a_1, \ldots, a_{n-1}$.

Constraints

- $2 \leq k \leq n \leq 10^5$
- $0 \leq a_i \leq 10^{18}$

Output Format

Print two lines of output:

1. The first line contains the maximal *bitwise AND* value of any k-element subsequence of A.
2. The second line contains the number of subsequences of A having that maximal *AND* value, modulo $(10^9 + 7)$.

Sample Input 0

```
3 2
3
5
6
```

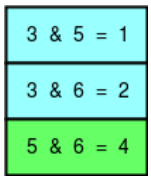
Sample Output 0

```
4
1
```

Explanation 0

For $A = [3, 5, 6]$ and $k = 2$, there are three possible subsequences of size k. Let's apply the *AND*

operation to each subsequence:



The maximum *bitwise AND* of any subsequence is 4, and only 1 subsequence ($\{5, 6\}$) gives us that value. We then print 4 as our first line of output and the result of $1 \bmod (10^9 + 7) = 1$ as our second line of output.

Sample Input 1

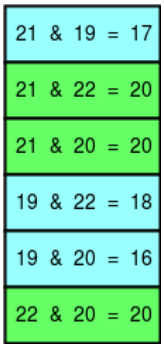
```
4 2
21
19
22
20
```

Sample Output 1

```
20
3
```

Explanation 1

For $A = [21, 19, 22, 20]$ and $k = 2$, we perform the following *AND* operations on each subsequence:



The maximum *bitwise AND* of any subsequence is 20, and there are 3 such subsequences ($\{21, 22\}$, $\{21, 20\}$, and $\{22, 20\}$) giving us that value. We then print 20 as our first line of output and the result of $3 \bmod (10^9 + 7) = 3$ as our second line of output.

Sample Input 2

```
4 3
9
15
27
14
```

Sample Output 2

```
10
1
```

Explanation 2

For $A = [9, 15, 27, 14]$ and $k = 3$, there are four k-element subsequences: $\{9, 15, 27\}$, $\{9, 15, 14\}$, $\{9, 27, 14\}$, and $\{15, 27, 14\}$. The maximum *bitwise AND* of any subsequence is 10, and there is 1 such

subsequence ($\{15, 27, 14\}$) giving us that value. We then print 10 as our first line of output and the result of $1 \bmod (10^9 + 7) = 1$ as our second line of output.