Scheduler Redux

Time limit: *2500 ms*
Memory limit: *256 MB*

This is a harder version of the Scheduler problem.

In this challenge you must figure out how quickly N jobs can be completed by M workers. Each job will take 2^x amount of time, where x is a positive integer.

Since the amount of time could be quite large, you should indicate the amount of time needed modulo $10^9 + 7$.

In this harder version of the problem, two jobs CAN have the same time to finish.

Standard input

Each input has a single test case.

The input begins with a line containing two space-separated integers, N and M. N specifies the number of jobs, and M specifies the number of workers.

The next line of input contains N integers, where the i^{th} integer, X_i, indicates that job i takes 2^{X_i} time.

Standard output

Output the minimum amount of time required to complete all of the jobs, modulo $10^9 + 7$.

Constraints and notes

- $1 \leq N \leq 100,000$
- $1 \leq M \leq 20$
- $0 \leq X_i \leq 100,000$

Input	Output	Explanation
5 2 1 1 2 2 2	8	The job times are 2, 2, 4, 4, and 4, respectively. One of the strategies is to give jobs 1, 2, and 3 to worker 1, and job 4 and 5 to worker 2. The total time for worker 1 is 8 (from 2 + 2 + 4). The total time for worker 2 is also 8 (from 4 + 4). Thus, the time needed is 8.
3 1 1 2 2	10	
5 2 9998 9998 9998 9999 10000	382014751	