Pan African Olympiad in Informatics Team Selection Test 2025

The gift of solving

Time limit: 2 seconds **Memory limit: 512 MB**

Hachem was playing around with a cool gadget he found at a beachside toy store: The main part consists of N screens and pins, each showing an integer (initially all screens show 0), and the second part consists of a gear and a button. To change the values on the screens, the user must start by pushing down any of the pins, and then pressing the button to lock the positions; shifting the gear's teeth clockwise X ($X \geq 1$) times increments the numbers on the screens in front of the pushed pins by the same amount X. Pressing the button again raises the pins and unlocks positions.

A puzzle on this toy is defined by giving a desired configuration of the screens A where each entry $A[i]$ ($1 \leq i \leq N$) (the positions are 1-indexed) denotes the number that should be displayed on the ith screen, and a fixed number K of positions that the user can modify at a time (the user must pick exactly K positions at a time). If the user manages to achieve the desired configuration in M presses of the button or less, such that $M * K \leq 3 * 10^6$, they have sucessfully solved the puzzle.

Hachem eventually got bored of the toy, and noticed that Taki didn't have particularly much to do, so he quickly wrote a puzzle down for him on a piece of paper and offered the toy to him as a symbolic gift if he manages to solve it. Help Taki develop the strategy needed to do so in the given constraints, or determine that one does not exist.

Problem Description

You are given an array A of N integers, and an integer K. Find an efficient strategy to transform an array B of N integers (initially $B[i] = 0$ for $1 \leq i \leq N$) into A by doing M ($M * K \leq 3 * 10^6$) operations or less, where an operation consists of choosing any positive integer X and selecting exactly K distinct positions $P[0], P[1], ..., P[K-1]$ ($1 \leq P[i] \leq N$), then incrementing the value of each position $B[P[j]]$ ($0 \leq j < K$) by X.

Input

Input is formatted as follows:

```
N K
A[0] A[1] A[2] ...  A[N-1]
```

Output

Let C ($C * K \leq 3 * 10^6$) be the amount of operations in your solution, $P[i][j]$ ($0 \leq i < C, 0 \leq j < K$) the jth position selected on the ith operation, and $X[i]$ ($0 \leq i < C, X[i] > 0$) the amount those positions were incremented by on the ith operation. Output is expected as follows:

```
C
X[0] P[0][0] P[0][1] P[0][2] ...  P[0][K-1]
X[1] P[1][0] P[1][1] P[1][2] ...  P[1][K-1]
...
X[C-1] P[C-1][0] P[C-1][1] P[C-1][2] ...  P[C-1][K-1]
```

Constraints

- $1 \leq K \leq N \leq 10^6$ and $K * N \leq 2 * 10^6$
- $A[i] \geq 1$ ($1 \leq i \leq N$), sum of all $A[i]$ does not exceed 10^{18}.

Subtasks

Subtask	Points	Constraints
1	7	$K = 2$, sum of all $A[i]$ does not exceed 10
2	11	$K = 2$, sum of all $A[i]$ does not exceed 10^5
3	12	sum of all $A[i]$ does not exceed 10^5
4	19	for all $1 \leq i, j \leq N$, $A[i] = A[j]$
5	51	No additional constraints

Example

Input:

```
4 2
2 3 3 2
```

Output:

```
3
2 3 1
1 3 2
2 2 4
```

Explanation

To achieve the described configuration, we can add 2 to the first and third positions ($[2, 0, 2, 0]$), then 1 to the second and third positions ($[2, 1, 3, 0]$), and finally 2 to the second and fourth positions ($[2, 3, 3, 2]$), thus resulting in the desired array in 3 operations, only modifiying 2 positions at a time.