Phase Synchronization (phaserepair)

You oversee N Internet-of-Things (IoT) devices arranged on a ring of M residues. The devices are numbered from 0 to $N-1$.

Each device displays a phase represented by an integer between 0 and $M-1$ (inclusive). The initial phase of device i is A_i.

Your goal is to make **all** devices display the same phase. To achieve this, you may repeatedly broadcast an instruction of the form "bump r". This instruction causes every device whose current phase is exactly r to shift to phase $(r+1) \bmod M$.

Find a sequence of instructions with the **minimum** possible length that makes every device display the same phase.

Input

The input file consists of:

- a line containing integers N and M;
- a line containing the N integers $A_0, \ldots, A_{N-1}$.

Output

The output file must contain two lines:

- a line containing integer B – the minimum number of instructions required to synchronize all devices;
- a line containing B integers $R_0, \ldots, R_{B-1}$ describing the parameters of one optimal sequence, in order.

If there is more than one optimal sequence, you may output any of them.

Constraints

- $1 \le N \le 200\,000$.
- $1 \le M \le 200\,000$.
- $0 \le A_i < M$ for each $i = 0 \ldots N-1$.

Scoring

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases.

Let D denote the number of distinct values that appear among the initial phases.

– **Subtask 1** (0 points) Examples.

– **Subtask 2** (10 points) Either $M = 1$ or $D = 1$.

– **Subtask 3** (15 points) $N, M \leq 1000$.

– **Subtask 4** (25 points) $D \leq 20$.

– **Subtask 5** (20 points) The initial phases form one contiguous arc modulo M.

– **Subtask 6** (30 points) No additional limitations.

Examples

input	output
5 2 1 0 1 0 0	1 0
5 6 1 0 3 5 1	4 3 4 5 0
4 4 3 3 3 3	0

Explanation

In the **first sample case**, a single instruction with $r = 0$ synchronizes all devices. Note that a single instruction with $r = 1$ also works.

In the **second sample case**, the sequence of instructions with parameters $3, 4, 5$, and 0 align every device at phase 1.

In the **third sample case**, every device already displays the same phase.