Project Euler #217: Balanced Numbers



This problem is a programming version of Problem 217 from projecteuler.net

Fix an integer $B \geq 2$.

A positive integer with L digits (in base B) is called B-balanced if its first $\lceil \frac{L}{2} \rceil$ digits sum to the same value as its last $\lceil \frac{L}{2} \rceil$ digits when written in base B, where $\lceil x \rceil$ (ceiling of x) is the smallest integer $\geq x$, thus $\lceil \pi \rceil = 4$ and $\lceil 5 \rceil = 5$.

Examples:

- All palindromes (in base B) are B-balanced.
- ullet For B=10, $13722_{(10)}$ and $1322_{(10)}$ are 10-balanced.
- ullet For B=2, $10=1010_{(2)}$ and $22=10110_{(2)}$ are both 2-balanced.

You will be given B, L and an integer $N=d_{L-1}\dots d_{0}$ $d_{0}=\sum_{i=0}^{L-1}d_{i}B^{i}$, find the number and the sum of all B-balanced integers $1\leq x\leq N$.

Print your answers modulo 1004535809.

Input Format

The first line of each test file contains two space-separated integers B and L. The next line contains L space-separated integers d_{L-1},\ldots,d_0 (in this order), the digits of the integer $N=\sum_{i=0}^{L-1}d_iB^i$ in base B.

Constraints

- $2 < B < 10^4$
- $2 \le B \times L^2 \le 2 \times 10^7$.
- $0 \leq d_i < B$.
- $0 < d_{L-1}$

Output Format

Print two space-separated in one line, denoting the number and the sum in question.

Sample Input 0

10 1 7

Sample Output 0

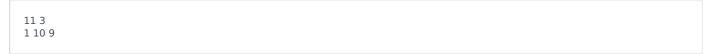
7 28

Explanation 0

The set of 10-balanced integers $1 \le x \le 7$ is

The cardinality of this set is 7 and its sum is 28.

Sample Input 1



Sample Output 1

31 2662

Explanation 1

The number given is equal to 240 when converted to base 10.

The set of 11-balanced integers $1 \le x \le 240$ is (when converted to base 10)

 $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 122, 133, 144, 155, 166, 177, 188, 199, 210, 221, 232\}$

The cardinality of this set is 31 and its sum is 2662.

Sample Input 2

10 4 4 8 5 7

Sample Output 2

378 876573