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

You will be given B, L and an integer $N = d_{L-1} \ldots d_{0\,(B)} = \sum_{i=0}^{L-1} d_i B^i$, 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 $N = \sum_{i=0}^{L-1} d_i B^i$ in base B.

Constraints

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

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 $1 \leq x \leq 7$ is

$$\{1, 2, 3, 4, 5, 6, 7\}$$

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

Sample Input 1

```
11 3
1 10 9
```

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 $1 \leq x \leq 240$ 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
```