Project Euler #156: Counting Digits

HackerRank

This problem is a programming version of Problem 156 from projecteuler.net

Starting from zero the natural numbers are written down in base 10 like this: $0\ 1\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9\ 10\ 11\ 12\ldots$

Consider the digit $d = 1$. After we write down each number n, we will update the number of ones that have occurred and call this number $f(n, 1)$. The first values for $f(n, 1)$, then, are as follows:

n	$f(n,1)$
0	0
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	2
11	4
12	5

Note that $f(n, 1)$ never equals 3.

So the first two solutions of the equation $f(n, 1)$ are $n = 0$ and $n = 1$. The next solution is $n = 199981$.

In the same manner the function $f(n, d)$ gives the total number of digits d that have been written down after the number n has been written.

In fact, for every digit $d \neq 0$, 0 is the first solution of the equation $f(n, d) = n$.

Let $s(d)$ be the sum of all the solutions for which $f(n, d) = n$.

You are given base b and the set M of digits in base b. Find $\sum_{d \in M} s(d)$ for numbers written in base b.

Note: if, for some n, $f(n, d) = n$ for more than one value of d this value of n is counted again for every value of d for which $f(n, d) = n$.

Input Format

First line of each test contains two integers: b and $|M|$ - base and the cardinal number of M. Second line contains $|M|$ distinct space-separated digits M_i in base b.

Constraints

- $2 \leqslant b \leqslant 10$
- $1 \leqslant |M| < b$
- $1 \leqslant M_i < b$

Output Format

Output a single number which is the answer to the problem.

Sample Input

```
2 1
1
```

Sample Output

```
3
```

Explanation

There are two solutions where $f(n, 1) = n$ which are $n = 1_2 = 1$ and $n = 10_2 = 2$. Starting from $n = 11_2 = 3$ $f(n, 1) > n$.