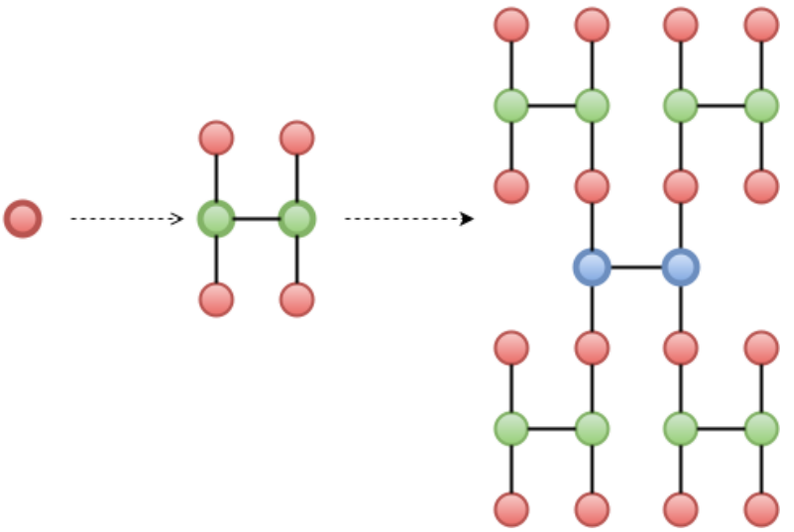
Hackerrank City

Hackerrank-city is an acyclic connected graph (or tree). Its not an ordinary place, the construction of the whole tree takes place in N steps. The process is described below:

- It initially has 1 node.
- At each step, you must create 3 duplicates of the current tree, and create 2 new nodes to connect all 4 copies in the following `H` shape:



At each i^{th} step, the tree becomes 4 times bigger plus 2 new nodes, as well as 5 new edges connecting everything together. The length of the new edges being added at step i is denoted by input A_{i}.

Calculate the sum of distances between each pair of nodes; as these answers may run large, print your answer modulo 1000000007.

Input Format

The first line contains an integer, N (the number of steps). The second line contains N space-separated integers describing A_0, $A_1, \ldots, A_{N-2}, A_{N-1}$.

Constraints
$1\le N \le 10^6$
$1 \le A_i \le 9$

Subtask
For 50% score $1 \le N\le 10$

Output Format

Print the sum of distances between each pair of nodes modulo 1000000007.

Sample Input 0

```
1
1
```

Sample Output 0

```
29
```

Sample Input 1

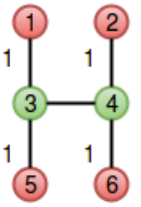
```
2
2 1
```

Sample Output 1

```
2641
```

Explanation

Sample 0
In this example, our tree looks like this:



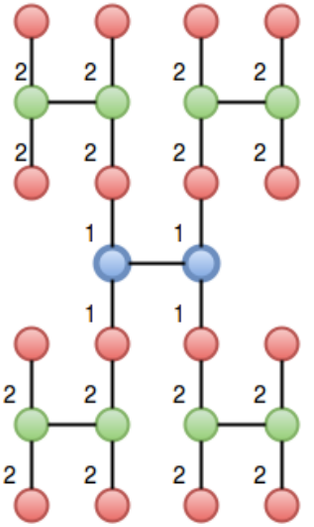
Let $d(u,v)$ denote the distance between nodes u and v.

$d(1,2)+d(1,3)+d(1,4)+d(1,5)+d(1,6)$ $+d(2,3)+d(2,4)+d(2,5)+d(2,6)+d(3,4)$ $+d(3,5)+d(3,6)+d(4,5)+d(4,6)+d(5,6)=$ $3+1+2+2+3+2+1+3+2+1+1+2+2+1+3=29$.

We print the result of $29 \ \% \ 1000000007$ as our answer.

Sample 1

In this example, our tree looks like this:



We calculate and sum the distances between nodes in the same manner as *Sample 0* above, and print the result of our $answer \ \% \ 1000000007$, which is 2641.