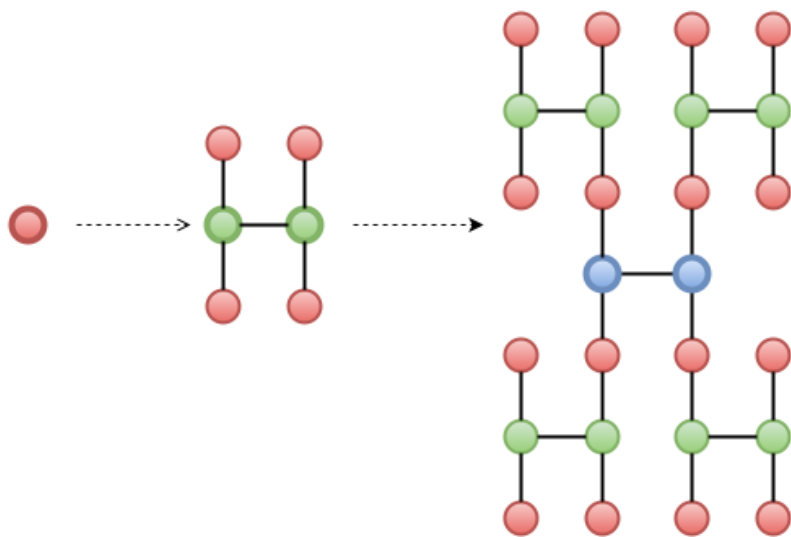


# HackerRank City

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  $A_0, A_1, \dots, A_{N-2}, A_{N-1}$ .

## Constraints

$$1 \leq N \leq 10^6$$
$$1 \leq A_i \leq 9$$

## Subtask

For **50%** score  $1 \leq N \leq 10$

## 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
```

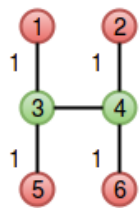
Sample Output 1

```
2641
```

Explanation

Sample 0

In this example, our tree looks like this:



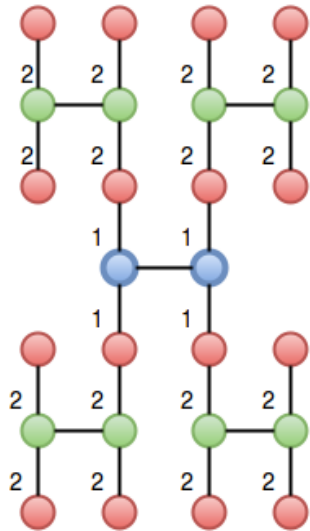
Let  $d(u, v)$  denote the distance between nodes  $u$  and  $v$ .

$$\begin{aligned} & d(1, 2) + d(1, 3) + d(1, 4) + d(1, 5) + d(1, 6) + d(2, 3) + d(2, 4) + d(2, 5) + d(2, 6) + d(3, 4) \\ & + d(3, 5) + d(3, 6) + d(4, 5) + d(4, 6) + d(5, 6) = \\ & 3 + 1 + 2 + 2 + 3 + 2 + 1 + 3 + 2 + 1 + 1 + 2 + 2 + 1 + 3 = 29 . \end{aligned}$$

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`.