E. Random Elections

time limit per test: 2 seconds
memory limit per test: 1024 megabytes
input: standard input
output: standard output

The presidential election is coming in Bearland next year! Everybody is so excited about this!

So far, there are three candidates, Alice, Bob, and Charlie.

There are n citizens in Bearland. The election result will determine the life of all citizens of Bearland for many years. Because of this great responsibility, each of n citizens will choose one of six orders of preference between Alice, Bob and Charlie uniformly at random, independently from other voters.

The government of Bearland has devised a function to help determine the outcome of the election given the voters preferences. More specifically, the function is (takes n boolean numbers and returns a boolean number). The function also obeys the following property: $f(1 - x_1, 1 - x_2, \ldots, 1 - x_n) = 1 - f(x_1, x_2, \ldots, x_n)$.

Three rounds will be run between each pair of candidates: Alice and Bob, Bob and Charlie, Charlie and Alice. In each round, x_i will be equal to 1, if i-th citizen prefers the first candidate to second in this round, and 0 otherwise. After this, $y = f(x_1, x_2, \ldots, x_n)$ will be calculated. If $y = 1$, the first candidate will be declared as winner in this round. If $y = 0$, the second will be the winner, respectively.

Define the probability that there is a candidate who won two rounds as p. $p \cdot 6^n$ is always an integer. Print the value of this integer modulo $10^9 + 7 = 1\ 000\ 000\ 007$.

Input

The first line contains one integer n $(1 \leq n \leq 20)$.

The next line contains a string of length 2^n of zeros and ones, representing function f. Let $b_k(x)$ the k-th bit in binary representation of x, i-th (0-based) digit of this string shows the return value of $f(b_1(i), b_2(i), \ldots, b_n(i))$.

It is guaranteed that $f(1 - x_1, 1 - x_2, \ldots, 1 - x_n) = 1 - f(x_1, x_2, \ldots, x_n)$ for any values of $x_1, x_2, ldots, x_n$.

Output

Output one integer — answer to the problem.

Examples

input

```
3
01010101
```

output

```
216
```

input

```
3
01101001
```

output

```
168
```

Note

In first sample, result is always fully determined by the first voter. In other words, $f(x_1, x_2, x_3) = x_1$. Thus, any no matter what happens, there will be a candidate who won two rounds (more specifically, the candidate who is at the top of voter 1's preference list), so $p = 1$, and we print $1 \cdot 6^3 = 216$.