

You are given a sequence of bits (a binary string) of length **N**. You need to generate a list of binary strings of length **N** starting from the given binary string. There can be **no repetitions** in the list, and any two consecutive binary strings in the list should differ by **only one bit**.

For example, binary string 0010 and 0110 differ only by one bit; 0010 and 0111 differ by two bits; 0010 and 0010 are the same; 0200 is not a binary string; 100 is not a binary string of length 4, while 0100 is a binary string of length 4.

This problem has partial scores. If your list is valid, then your score for that test case is  $\frac{L}{2^N} S$ , where **L** is the number of binary strings in your list and **S** is the allocated score for the test case.

### Input Format

The input will contain a non empty string of 0's and 1's indicating the initial binary string.

### Constraints

- $1 \leq N \leq 16$

### Output Format

First line of the output should contain a single integer **L**, the number of strings in your list. L lines should follow, the list of values.

### Sample Input 0

```
0010
```

### Sample Output 0

```
6
0010
1010
1000
1100
0100
0000
```

### Explanation 0

This will get a partial score factor of  $\frac{6}{2^4} = \frac{6}{16} = 0.375$ , out of allocated score for this test case. That is, if 10 points were allocated for this test case then you will only get 3.75 points.