A. Suffix Array and LCP

time limit per test: 2 seconds
memory limit per test: 512 megabytes

Try to implement the algorithm of Kasai, Arimura, Arikawa, Lee and Park find the values of lcp for the suffix array.

Build a suffix array for a given string s, for each two adjacent suffixes find the length of longest common prefix.

Input

First line holds a single string s of length n ($1 \le n \le 400\,000$). String consists of small english letters.

Output

In the first line print $n + 1$ distinct integers, indices of first characters of suffixes of s, ordered in lexicographical order.

In the second line print n integers, lengths of longest common prefixes.

Examples

input Copy

```
ababba
```

output Copy

```
6 5 0 2 4 1 3
0 1 2 0 2 1
```

input Copy

```
aaaa
```

output Copy

```
4 3 2 1 0
0 1 2 3
```

input Copy

```
ppppplppp
```

output Copy

```
9 5 8 4 7 3 6 2 1 0
0 0 1 1 2 2 3 3 4
```

input Copy

```
nn
```

output Copy

```
2 1 0
0 1
```