2.4 Problem 3

Step 1

Introns Detection

In this problem you are given 10 different tests for the proposed problem in 10 different tabs. You should submit only answers in the plain text format. Depending on the quality of the answer you will be given some fraction of the points on the corresponding test (the exact formula is described in the problem statement).

The points are distributed as follows: for the first test – 100, for others – 150. There is no limit on time nor memory. You are only limited by the performance of your computer and the duration of the contest.

The tests for this problem were generated using some manipulations on real life genomes. There could be arbitrary changes of nucleotide bases (errors), the introns/exons could be shuffled, the genomes of different organisms could be used and etc.

Note that you could not submit files of size bigger than **5 Megabytes**.

You can download all tests using this link: https://stepik.org/media/attachments/lesson/30033/tests.zip.

Step 2

Introns Detection

The DNA strand consists of exons and introns. The exons are the coding parts of the DNA, while the introns are not. During the process of transcription, DNA sequence of a gene gets copied into an RNA molecule, where the introns are removed during a process called RNA splicing.

Recently, BioLabs Inc. developed an instrument to get some information on what gets spliced out of a gene sequence. Using ~~black magic~~ a complicated biochemical process this instrument produces a number of "reads": substrings of a DNA sequence after the splicing. They hired you to write a program to restore a possible DNA sequence after the splicing operation: that is a sequence that contains as many reads as possible as substrings and that can be obtained from original DNA sequence by a splicing procedure.

In other words, there is a string S, the splicing results in a string T which is a subsequence of S. Your task it to restore T given S and a number of T's substrings.

Notes

In tests almost all the DNA sequences, exons and introns are generated using real-life data. The reads are emulated using known result of DNA splicing. That means that for each test there exists an answer that satisfies all the reads.

Note, that the tests are approximately sorted by their sizes and not specifically by difficulty. Probably, it will be easier to solve test 6 rather than 4, for example.

Input Format

The first line of the input contains an original DNA sequence represented as a string of characters A, C, G, T. The second line contains one integer n --- the number of reads. Each of the next n lines contains one read each.

Output Format

The first line of the output should contain a possible DNA sequence after the splicing. Next n lines should contain one integer each - the position of the corresponding read in the proposed DNA sequence after the splicing. The position are counted starting from one. If your output doesn't contain some of the reads then you can put -1 in the corresponding line.

Examples

Sample Input

```
TAGCGCGT
3
AC
CGCG
GT
```

Sample Output

```
ACGT
1
-1
3
```

Scoring

Let the total number of points be p and your output contains k correct reads $r_1, r_2. \ldots, r_k$ out of n. For each read r_i with index $2i \leq n$ you get $a = \frac{0.1p}{n}$ additional points. For each read r_i with index $2i > n$ you get $a + (n - i + 1)b$ additional points, where b is chosen in such a way that if $k = n$ you will get all points.

In other words, if your result contains at most half of the reads then you could get no more than 10% of all points. If your output contains more than or equal to the half of the given reads, then you get score from 10% to 100% of total points.

Step 3

Introns Detection (Test #1)

Upload your result on the test #1.

This test could be downloaded at https://stepik.org/media/attachments/lesson/30033/1.zip.

To solve this problem please visit https://stepik.org/lesson/39304/step/3

Step 4

Introns Detection (Test #2)

Upload your result on the test #2.

This test could be downloaded at https://stepik.org/media/attachments/lesson/30033/2.zip.

To solve this problem please visit https://stepik.org/lesson/39304/step/4

Step 5

Introns Detection (Test #3)

Upload your result on the test #3.

This test could be downloaded at https://stepik.org/media/attachments/lesson/30033/3.zip.

To solve this problem please visit https://stepik.org/lesson/39304/step/5

Step 6

Introns Detection (Test #4)

Upload your result on the test #4.

This test could be downloaded at https://stepik.org/media/attachments/lesson/30033/4.zip.

To solve this problem please visit https://stepik.org/lesson/39304/step/6

Step 7

Introns Detection (Test #5)

Upload your result on the test #5.

This test could be downloaded at https://stepik.org/media/attachments/lesson/30033/5.zip.

To solve this problem please visit https://stepik.org/lesson/39304/step/7

Step 8

Introns Detection (Test #6)

Upload your result on the test #6.

This test could be downloaded at https://stepik.org/media/attachments/lesson/30033/6.zip.

To solve this problem please visit https://stepik.org/lesson/39304/step/8

Step 9

Introns Detection (Test #7)

Upload your result on the test #7.

This test could be downloaded at https://stepik.org/media/attachments/lesson/30033/7.zip.

To solve this problem please visit https://stepik.org/lesson/39304/step/9

Step 10

Introns Detection (Test #8)

Upload your result on the test #8.

This test could be downloaded at https://stepik.org/media/attachments/lesson/30033/8.zip.

To solve this problem please visit https://stepik.org/lesson/39304/step/10

Step 11

Introns Detection (Test #9)

Upload your result on the test #9.

This test could be downloaded at https://stepik.org/media/attachments/lesson/30033/9.zip.

To solve this problem please visit https://stepik.org/lesson/39304/step/11

Step 12

Introns Detection (Test #10)

Upload your result on the test #10.

This test could be downloaded at https://stepik.org/media/attachments/lesson/30033/10.zip.

To solve this problem please visit https://stepik.org/lesson/39304/step/12