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# Problem C

## Warp Speed

**Input:** Standard Input

**Output:** Standard Output

In the not-so-distance future, space engineers can invent a new technology for traveling through space and name it as “warp-drive”. This warp-drive can make a spaceship travel faster than light speed. It works by bending an amount of distance in space and make a ship travel through that bended space in a single “hop”. And since the time spent for each hop is equal, the total traveling time for any spaceship (that is equipped with this warp-drive) depends on the number of hops it make. Moreover, these engineers notice that distance of a hop depends on some kind of force fields in the space where that hop is operated. To travel from a beginning to an ending point, a spaceship may have to pass through many force fields, which may make that spaceship hop so many times.

And from their experiments, they found some facts as follow.

- A number of force field types is quite small.
  - So one English character can be used to name each of these force filed types.
- A spaceship can pass through every single force field in a single hop.
- A spaceship can pass through a certain sequences of two or more force fields in a single hop. And these certain sequences are kept as rules of single-hop-able sequences.
  - An example of list of these rules is shown as in the following table.

Rules of Single-hop-able Sequences
ab
abcd
abd
bde

- In this example, there are 4 rules, which means that a spaceship can pass through each of them using a single hop. The first one is “ab”, which means that a spaceship can pass through 'a' and 'b' force field in a single hop. The second one is “abcd” which means that it can pass through 'a', 'b', 'c' and 'd' in one hop.
- Please be notified that there is no “abc” sequence/rule in this example, so even though the ship can pass through “abcd” sequence, it is unable to pass through “abc” (in a single hop). It has to make 2 hops, the first hop is to pass through “ab” sequence and the second hop is to pass through “c” force field.

### Goal

Suppose that you are an engineer on a battle spaceship. Your duty is to drive your spaceship through space as fast as possible. Your spaceship has a probe device that can identify a sequence of force fields along the path to your destination. In order to accomplish your duty, you have to build a computer program to find the minimum hop based on rules and any given sequences of force fields.

## Input

Input is standard inputs which contain 2 parts of data which are separated by a blank line.

The first part is a set of rules of single-hop-able sequences. The number of rules is between 1 and 10,000.

- Each line in this first part contains one rule.
- Each rule is a (sub)sequence of force fields specified by a string of alphabets (a-z, A-Z).
- The order in every (sub)sequence is from left to right.
- The size of any (sub)sequence is between 2 and 20.

The second part is a set of force fields along path that a spaceship has to pass through. The number of sequence is between 1 and 200.

- Each line in this second part contains one sequence of force field in one path.
- Each sequence is specified by a string of alphabets (a-z, A-Z).
- The order in every sequence is from left to right.
- The size of any sequence is between 2 and 500.

The blank line after the second part is the termination of the input.

## Output

For each sequence in the second part of input, write 2 parts of output as follows

- In the first line, write the total number of solutions followed by a space and the number of minimum hops.
- In the following lines, write each of the solutions in each line. Each solution contains a sequence of force fields as given in the input, where a space is inserted between each hop sub sequences. If there are two or more solutions, they must be sorted by ascending and lexicographical (ASCII) order.

Sample Input	Output for Sample Input
ab abcd abd bde CgeF  abc abcd abde abdeabde abdeCgeFabde	1 2 ab c 1 1 abcd 2 2 a bde abd e 4 4 a bde a bde a bde abd e abd e a bde abd e abd e 4 5 a bde CgeF a bde a bde CgeF abd e abd e CgeF a bde abd e CgeF abd e

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### **More Explanations**

There are 5 rules and 5 input sequences in this sample input.

In the first sample output, there is 1 solution with 2 hops. The first hop is from the first rule.

In the second output, there is 1 solution with 1 hop using the second rule for the whole sequence.

In the third output, there are 2 solutions with 2 hops. Its first solution is from the 4<sup>th</sup> rule and the second solution is from the 3<sup>rd</sup> rule.

In the fourth output, there are 4 solutions with 4 hops. The first solution is applied using the 4<sup>th</sup> rule twice. The second and third is applied using the 3<sup>rd</sup> and 4<sup>th</sup> rules in different position. The last solution is applied using the 3<sup>rd</sup> rules twice

The last output is quite similar to the fourth one, but it is also applied with the fifth rule in the middle of the sequence.