A. Hard Computing

During winter the Kama river was frozen and Andrey cut a rectangulat piece of ice 4 by N meters. In how many ways he can cut it into 3 by 1 tiles? You should write a program that prints the reminder after answer is divided by 1000000007.

Input format:

In the only line of input data there is an integer 1<=N<=10000.

Output format:

In the ony line of output you should print the answer.

Sample input:

6

Sample output:

13

B. Box in circle

Frozen Kama has round water-hole of radius R. You should write a program that prints the maximum area of a rectangle inclined in the water-hole with a maximum shorter side B.

Input format:

In the only line of input data there are two integers R and B (1<=R,B<=10000).

Output format:

In the only line of output data there is an integer: the maximum area rounded to the closest integer.

Sample input:

2 2

Sample output:

7

C. XOR it

You will be given a list of Q (1 <= Q <= 15) instructions. If the instructions is to "insert N", insert N into the list of numbers (there may be duplicates). If the instruction is to "print" - print the XOR sum of the largest K (1<=K<=Q) elements in the list (or, if the list contains less than K elements, the XOR sum of all elements in the list). XOR sum of a list of numbers is the result of XOR-ing all of them.

Input format:

Input starts with a line containing two integers Q and K (1 <= Q,K <= 100,000). Following are Q lines containing one instruction each. Instructions are in either of the following two forms: insert N or print N is a non-negative integer less than 2^31.

Output format:

For each print statement output the sum of (at most) K largest elements in the current list.

Sample input:

```
5 2
insert 1
insert 2
print
insert 3
print
```

Sample output:

```
3
1
```

D. 127.0.0.1 is a wide river

A friend of yours is a bit on a geeky side. Among other things, he likes to replace some common English words with... IPv4 addresses?!? Being a good friend you would like to at least remove these literary abominations from his documents. You somehow got hold of his map of words to addresses (or, it turns out, to range of addresses). Now you would like to replace IPv4 addresses with the original English words. IPv4 address, if you are not familiar with it, is a 32-bit unsigned integer usually represented in dot-decimal notation (e.g. 172.30.12.255 - 4 8-bit unsigned integers separated by dots).

Input Format:

First line of the input contains an integer M (1 <= M <= 1000), the number of map entries. Each of the next M lines contains an entry that can contain either word followed by an IP address or a word followed by 2 IP addresses (see sample input). In the first case, only the given address should be replaced with a word. In the second case, any address within the range should be replaced with the given word. If a range is given, the first address will always be less than the second one. There will be no duplicate entries in the map, meaning no word will apear more than once and no address will repeat. There will be no overlapping ranges of addresses either.

Next line starts with an integer N (1 <= N <= 1000), the number of lines of text. Each of the next N lines contains at most 20 words and/or IP addresses separated by single spaces. Words will contain only letters of English alphabet and IP addresses will be valid (consisting only of digits and dots).

Output Format:

For each line of text, replace all IP addresses for which you have matching words and print the result to the output. If there is no word mapped to an address that appears in the text, just print the address as is.

Sample Input:

```
3
home 127.0.0.1
smile 255.255.255.0 255.255.255.255
gate 10.0.0.1
4
There is no place like 127.0.0.1
Hannibal at the 10.0.0.1
Let us put a 255.255.255.89 on that face
I am very very 1.2.3.4
```

Sample output:

```
There is no place like home
Hannibal at the gate
Let us put a smile on that face
I am very very 1.2.3.4
```