

Problem J

Words

Given two sets of words formed by zeros and ones, you must write a program to determine if there are concatenations of words of each of the sets that generate the same word. For example, if a set A contains the words 010 and 11 and another set B contains the words 0 and 101, then the word 01,011,010 can be formed both by concatenating words of A and by concatenating words of B .

$$010 \cdot 11 \cdot 010 = 01011010 = 0 \cdot 101 \cdot 101 \cdot 0$$

Input

The input contains several test cases. The first line of a test case contains two integers, N_1 and N_2 , which indicate respectively the number of words in the first and the number of words in the second sets. Each of the following N_1 lines contains a word of the first set. Each of the following N_2 lines contains a word of the second set.

Output

For each test case your program must print a single line, containing a single character. If it is possible to find a concatenation of one or more words of the first set that is equal to a concatenation of one or more words of the second set then the character must be **S**, otherwise the character must be **N**.

Restrictions

- $1 \leq N_1, N_2 \leq 20$
- Each word has at least one and at most 40 characters, all zeros and ones.

Example

Sample input	Sample output
2 2	S
010	N
11	S
0	
101	
3 1	
1	
00	
000	
01	
1 1	
00	
000	