



## Reescritura

Félix really likes to play with *strings*. Today he has discovered a way to transform *strings* and asks for your help to find out if he can transform a given *string* into another one.

The possible transformations are given by a set of rules with the following properties:

- The given rules are of the form  $c \rightarrow ab$ , where  $a, b, c$  are characters.
- Each rule  $c \rightarrow ab$ , can be applied to replace an occurrence of  $c$  with  $ab$ . For example, if you have the rule  $a \rightarrow bc$  we can transform the string `abca` into `bcbca` by applying the rule on the first character.
- These transformations can be applied successively. For example with  $a \rightarrow bc$ ,  $b \rightarrow mm$  from the *string* `abca` we can obtain `bcbca`, `mmcbca`, `ammca`, `bcbcbc`...
- We are assured that for each character  $c$  there is at most one rule of the form  $c \rightarrow ab$ .
- We are assured that the given rules *do not form cycles*. That is, for any character  $c$ , by applying the rules successively on the string containing only character  $c$ , we cannot get to any distinct string containing character  $c$ .

## Input and output

The first line of the input contains the number of cases  $T$ .

For each case there is a first line with  $n$  where  $n$  is the number of rules, followed by  $n$  rows where in the  $i$ -th row there is a rule given as `a->bc` where  $a, b, c$  are characters. A line follows with a string  $s$  and a string  $t$ .

For each case a line with “SI” or “NO” (without quotes) must be printed in case  $s$  can be converted into  $t$  by applying the given rules or not, respectively.

## Example

Input:

```
2
1
a->bc
aa
bca
3
a->bc
b->cc
c->mn
abc
acmnx
```

Output:

```
SI
NO
```



## Constraints

$$1 \leq T \leq 100$$

$$1 \leq n \leq 59$$

The sum of the lengths of all  $s$  and  $t$  for all cases is at most  $3 \cdot 10^5$ .

All characters displayed are lowercase letters (a-z), uppercase letters (A-Z) or numbers (0-9).

## Subtasks

1. (17 points) Only **a** and **b** appear as characters.
2. (18 points)  $n = 1$ .
3. (31 points) Sum of lengths of  $s$  and  $t$  in each of the cases is at most 60.
4. (34 points) No additional restrictions.