

# Tautology

Write a program that checks if the given logical expression is a tautology. The logical expression is a tautology if it is always true, regardless of logical value of its variables.

## Input

On the first line there is the number of expressions to check (at most 35). The expression is in a prefix notation, that means that operator precedes its arguments. The following logical operators will be used:

C - and  
D - or  
I - implies  
E - if, and only if  
N - not

The variables will be lowercase letters (a-z). There will be no more than 16 different letters in the expression. The length of the expression will not exceed 111 characters.

## Output

For each expression write one word: YES if it is a tautology, NO in other case.

## Example

### Sample input:

```
7
I I p q D p N p
N C N p p
I a z
N N N N N N N p
I I q r I I p q I p r
I p p
E z z
```

### Sample output:

```
YES
YES
NO
NO
YES
YES
YES
```