

Problem 11: 'Tiger's *Tetris* Tournament Trickster

10 Point(s)

Problem ID: `tetris`

Rank: 3

Introduction

[TETR.IO](#) is an online multiplayer modern *Tetris* server with millions of players. [Qepsi](#) is a [Lexington Informatics Tournament \(LIT\)](#) organizer and *TETR.IO* player currently ranked **top 70 in the world!** She demonstrates her skills in the *Tetris* Game Night, hosted during each iteration of LIT. One time, Qepsi plays so well that [CodeTiger](#), another LIT organizer and *TETR.IO* player, suspects she is cheating by rigging the order of the game's pieces!

Problem Statement

You're given a sequence of N pieces P_1, P_2, \dots, P_N placed from the start of a *Tetris* game. Could these have been placed in a legitimate game, or has the game been tampered with?

Tetris has seven pieces: **ZLOSIJT** (in this problem, piece colors are for illustrative purposes only.) The game generates a sequence of contiguous *bags*, each containing exactly one of each piece in a random order. The player receives pieces from these bags one after another, with a new bag beginning after the previous bag finishes. **The generated sequence is not necessarily the same as the given placed sequence!**

Whenever a player receives a piece, they have the option to *place* the piece in the placed sequence or *hold* the piece in their *hold slot*, which is initially empty.

1. If they **place** the piece, it is appended to the end of the placed sequence.
2. If they **hold** the piece, what happens next depends on the hold slot:
 - a. If the hold slot is empty, it stores the current piece, and the player receives the next piece without placing anything.
 - b. If the hold slot is not empty, the current piece is swapped with the held piece. The player then *places* the piece that was initially held.

We say that the given sequence could have been placed in a legitimate game if there exists both a generated sequence and a series of moves under the above rules that produce it.

Input Format

The first line of the input contains an integer T denoting the number of test cases that follow.

For each test case:

- The first line contains an integer N denoting the number of pieces placed.
- The second line contains a string of uppercase letters P_1, P_2, \dots, P_N , denoting the sequence of **placed** pieces.

Output Format

For each test case, output a single line containing `YES` if P_1, P_2, \dots, P_N could have been placed in a legitimate game and `NO` otherwise.

Constraints

$$1 \leq T \leq 100$$

$$1 \leq N \leq 10^5$$

The sum of N across all test cases in an input does not exceed 10^5 .

P contains only letters from the *Tetris* pieces `ZL O S I J T`.

Sample Test Cases

Sample Input

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```
3
3
LIT
14
JOTLIZZJSOTLSO
3
LOL
```

Sample Output

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```
YES
YES
NO
```

Sample Explanations

Test Case #1:

The pieces could have been placed directly (as in without holds) from the bag **LITZOSJ**. Many other bags would also have allowed this sequence.

Test Case #2:

One possibility is that the first bag was **JOTLIZS**. After placing the first six pieces directly, the **s** would be held, filling a previously empty hold slot. The game could then generate the second bag **ZJSOTLI**, from which the first six pieces are placed again. Instead of placing the **I**, however, the player swaps the held **s** with the **I** and places **s** instead. To place the final **o**, the player could directly place from any third bag starting with **o**.

Test Case #3:

Placing **L** twice would require taking pieces from at least two bags. With only three total pieces, the game could not have generated the second bag yet, indicating tampering.