

### Task 1

Write a program that changes an infix expression to a postfix expression according to the following specifications.

1. The infix expression to be converted is in the input file in the format of one character per line, with a maximum of 50 lines in the file. For example,  $(3+2)*5$  would be in the form:

```
(
3
+
2
)
*
5
```

2. The input starts with an integer on a line by itself indicating the number of test cases. Several infix expressions follows, preceded by a blank line.

3. The program will only be designed to handle the binary operators +, -, \*, /.

4. The operands will be one digit numerals.

5. The operators \* and / have the highest priority. The operators + and - have the lowest priority. Operators at the same precedence level associate from left to right. Parentheses act as grouping symbols that over-ride the operator priorities.

#### Output

The output file will have each postfix expression all on one line.

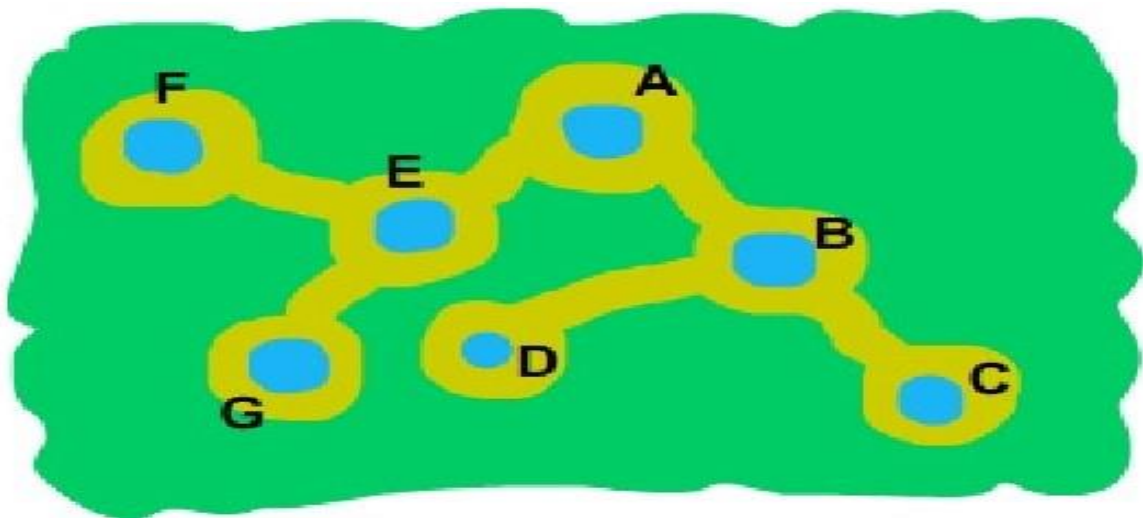
Input	Output
2	32+5*
( 3 + 2 ) * 5	35*2/6*32+/5*4+
( 3 * 5 / 2 * 6 / ( 3 + 2 ) * 5 ) + 4	

## Task 2

As usual Sultan Mahmud is very busy. He works days and nights at office. If you ask him, “Sultan, which day of the week is this?” He will look at you for a while and say, “I think I have 3 more days till deadline!” But one day the scenario changed after receiving a call. He usually ignores phone calls from everyone (even from his fiancé) but this time he couldn’t ignore because of the importance of the person! This person was his to-be mother-in-law. So he received the call and heard, “Son, only 30 days left of your wedding ceremony, so I am sending a tailor for the measurement for your suit.” Sultan now remembered, he is about to get married but looking at himself, he got surprised! When did he get so fat! “Umm.. Mom can it be arranged 10 days later?” He wants to buy some time so that he can exercise and lose extra weight. So he immediately went out with his bicycle to the large garden beside his house.

There are several trails in the garden. A trail starts from one water sprinkler to another and the sprinkler are marked by distinct letters from ‘A’ to ‘Z’. The trails are designed in such a way that from the sprinkler at entrance you can go to any other sprinkler using exactly one path if you do not traverse a trail more than once.

While traversing the trails with his cycle, Sultan notes the names of the sprinklers in his notepad. He will write down the name of a sprinkler if he enters the sprinkler for the first time or leaves this sprinkler for the last time. And not surprisingly, geek Sultan follows a peculiar method to ensure that he visits all the trails of the garden. When he comes to a sprinkler he looks for a trail which he has not traversed yet. If he finds such trail, he follows that one. Otherwise, he uses the trail that he used to come here for the first time except if it’s the entrance he stops exercising. He always starts from the entrance and guess what, his peculiar strategy always guarantees to finish him at the entrance and all the trails are also visited.



For example, in the above garden the main entrance is at A. So Sultan will start from A. When Sultan is at A, he can choose either of the trails. Say he chooses the trail leading to E. Then he can choose the trail to G or trail to F. Say he chooses F. Now he does not have any unvisited trail from F, so he will go back to E. Now he must choose trail to G and then similarly will come back to E and back to A. Then he will go towards B. Now he again has two choices. He can go to C or D, say he goes to C, then he will be back to B, then will go to D, and hence back to B and also back to A thus finishing his exercise. So after his exercise you will find: AEF FGGEBDDCCBA in his notepad. Can you find the number of trails attached to the sprinklers just looking at the sequence written in the notepad?

## Input

First line of the test file contains a positive integer  $T$  ( $T \leq 100$ ) denoting the number of test cases. Hence follows  $T$  lines, each containing a valid sequence of sprinkler names. A sprinkler name will always be capital Latin letter ('A', 'B', ..., 'Z'). You may assume that there will be at least two sprinklers in garden, otherwise there would have been no meaning of exercise right?

## Output

For each case output the case number in the first line, followed by the number of trails for each sprinkler. First print the sprinkler name followed by the count of trails. These lines should be in lexicographical order of sprinkler name. Note that, you should not print about a sprinkler which is not present in the garden. Look at the sample input output for more specific format of input output.

Input	Output
2 AEFFGGEBDDCCBA ZAABBZ	Case 1 A = 2 B = 3 C = 1 D = 1 E = 3 F = 1 G = 1 Case 2 A = 1 B = 1 Z = 2