Albert enjoys playing "Mini BINGO" on a 3x3 grid. You don't need to know about BINGO to solve this problem.

A	B	C
E	F	G
I	J	K

To play Mini BINGO, Albert begins by writing down 9 distinct English upper-case alphabets on the 3x3 grid. Then, he arbitrarily shuffles these 9 alphabets to choose a "seed" string S of length 9.

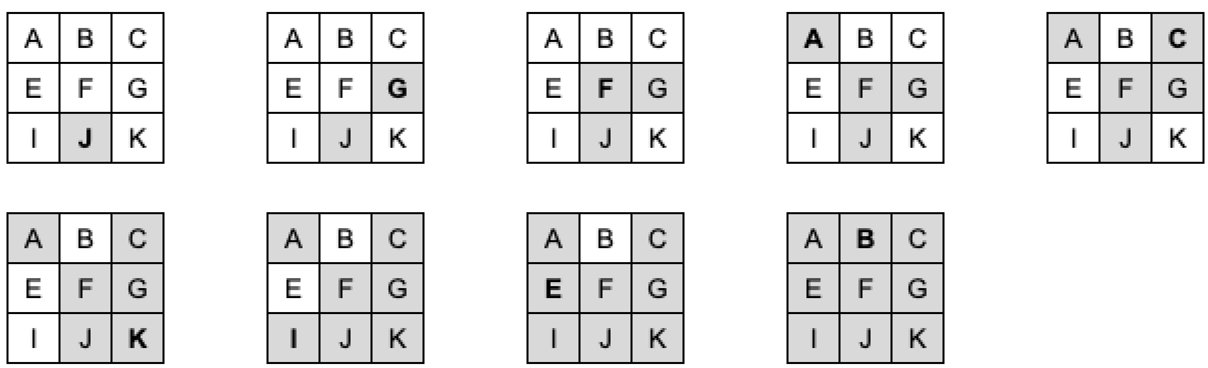
Albert will then color the alphabet cells according to the order given by the seed string, and calculate the score for each cell as follows.

- If all 3 cells in the same row as the cell being colored have been colored, then add 1 point to the cell's score.
- If all 3 cells in the same column as the cell being colored have been colored, then add 1 point to the cell's score.
- If all 3 cells in the main diagonal (A, F, and K in the example above) have been colored and the cell being colored is also in the main diagonal, then add 1 point to the cell's score.
- If all 3 cells in the anti diagonal (C, F, and I in the example above) have been colored and the cell being colored is also in the anti diagonal, then add 1 point to the cell's score.

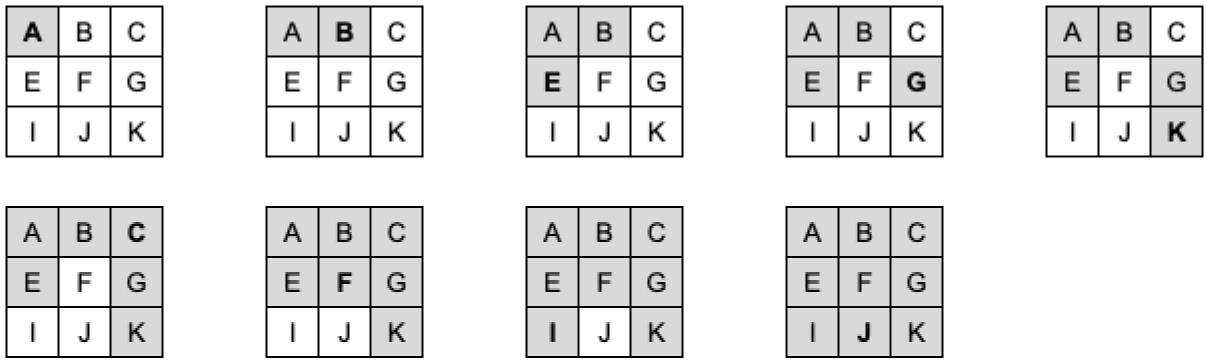
Given these rules, each cell's score will always be between 0 and 4 (inclusive), and we can obtain a string of length 9 by writing the scores of the cells in the same order as the seed string -- let us call this score string $T(S)$.

For instance, consider the seed string S = "`JGFACKIEB`". In the figure below, the first row's five images and the second row's four images show how the grid will be colored in the order given by the seed string.

- The first five cells being colored are "`J`", "`G`", "`F`", "`A`", and "`C`", each cell's score is 0.
- The sixth cell to be colored is "`K`", which yields 2 points due to the main diagonal and column 3.
- The seventh cell to be colored is "`I`", which yields 2 points due to the anti diagonal and row 3.
- The eighth cell to be colored is "`E`", which yields 2 points due to column 1 and row 2.
- The final cell to be colored is "`B`", which yields 2 points due to column 2 and row 1.
- As a result, the score string Albert obtains will be T(S) = "`000002222`".



In the same grid, if the seed string is S = "`ABEGKCFIJ`", then the grid will be colored as shown below, and the score string will be "`000002222`".



As these examples show, different seed strings can yield the same score string.

Albert believes that it is too trivial to compute $T(S)$ given the grid's alphabets and the seed string S. Hence, after computing the score string of S, Albert wants to find the seed string that yields the same score string $T(S)$) and comes lexicographically first. Let's help Albert.

Input

The first line will contain S, the number of test cases.

Each test case's first line will contain the seed string S of length 9.
The next three lines will describe the 3x3 grid by containing one string per line without whitespace.

Output

For each test case, output in a single line the score string $T(S)$ and the seed string that yields it and comes lexicographically first.

Limit

- $1 \le S \le 100$
- The seed string S will be of length 9 and will only contain alphabets '`A`'-'`Z`'. S will not contain duplicate alphabets.

- The 9 alphabets that describe the game grid will not contain duplicates, and these are exactly the alphabets given by �.

Sample Input 1 Copy

```
4
JGFACKIEB
ABC
EFG
IJK
ADSFGHJKL
ASD
FGH
JKL
QPWOEIRUT
QWE
RTU
IOP
AZSXDCFVG
ZFC
DGX
ASV
```

Sample Output 1 Copy

```
000002222 ABEGKCFIJ
001001213 ADSFGHJKL
000011114 EIOQPRUWT
```

```
000010124 ACDSVFXZG
```

Case 1: Described in the problem statement.

Case 2: The input seed string may come lexicographically first.

Cases 3-4: No explanation provided.

Hints

Lexicographic Order: Given two different strings � and � of the same length � where the two strings first differ at position �, let �[�] and �[�] be the characters of � and � at position �, respectively. Then, the lexicographic order of the strings � and � follow the lexicographic order of the alphabets �[�] and �[�].

Time Limit

- Java 8: 3 seconds
- PyPy3: 3 seconds