

UNITY

Introduction

The CFK planet was finally at peace. A year ago its inhabitants found a way to stop the invasion of bloodthirsty creatures which furiously attacked their settlements and forced beetlejumpers into a defensive stance. Groups of settlers held their ground for which they were amply rewarded.

The Planet's Council – following General Beattle's proposition – decided to commemorate the great battle. They enforced a new law according to which the streets and rooftops of buildings in each village were to be painted with the same number of colours as the number of battle squads taking part in the defense of the particular place. The mosaic was to represent the warriors' battle cry: "unity is the power". Moreover, to underline the fact that each team had contributed equally to the defense, each colour had to cover exactly the same amount of settlement's surface, and to be of the same shape when seen from above (only shape rotation is allowed).

Problem

Using the village plan you should propose the way to paint the settlement including every street or building (represented with a hash sign: '#') with a corresponding colour. Beetlejumpers know only 52 colours which are represented by different alphabet letters ([a-zA-Z]). Each coloured part has to represent a coherent figure, i.e. for each pair of single sectors (uniform squares '#' from the input plan) of the coloured part there is a path connecting them going only between neighbouring sectors from the same part (two sectors are neighbours if they share an edge).

Input data

Testing sets are located in `unity*.in` files.

The first line in a set has a single number N which denotes the number of settlements to be repainted.

Each village is described as below.

The first line of the description has the number K which represents the number of colours which are required to paint the settlement (the number of teams taking part in the defense). The second line has a pair of integers R and C separated with a single whitespace. They denote the number of rows and columns in the settlement plan.

In the following R lines you can find the definitions of village rows. The description of such a single row consists of a string of C characters which are either a dot ('.') or a hash sign ('#'). Hash represents a sector designated to be painted, a dot is a place which is not used.

Each settlement's plan represents a coherent figure. Moreover, there is always at least one way to apply colour division according to the rules described in this task.

$$1 \leq N \leq 10$$

$$1 \leq K \leq 52$$

$$1 \leq R \leq 64$$

$$1 \leq C \leq 64$$

Output data

The task is to provide a painting plan for each settlement. That is a matrix consisting of R rows and C columns. Rows are supposed to consist exclusively of dots '.' (not used places) and [a-zA-Z] letters representing colours. Villages must be arranged in the same way as in the input data.

Any solution conforming to the task description will be accepted, even if there are other possible ways to colour the settlement.

Example

For input data:

```
2
2
6 3
. . #
. . #
###
###
. . #
. . #
3
2 9
. . #####.
. #####..
```

A possible solution would be as follows:

```
. . A
. . A
AAA
BBB
. . B
. . B
. . CCBBAA.
.CCBBAA..
```

Score

If the solution of a given set is correct, the score is 1; otherwise it will be 0.