

# Cells

Tim loves spreadsheets. Everything he does on a computer, he does in a spreadsheet. Track his expenses? Create a spreadsheet! Decide which car to buy? Create a spreadsheet to compare them! Make an inventory of his games? Create a spreadsheet! Decide which girl he loves most? ...

Unfortunately his spreadsheet software just crashed and he needs some of the data right now and does not have the time to install a competing office suit.

Given the formulas used in the cells of a spreadsheet, calculate the values of all the cells.

## Input

The first line of the input file contains an integer  $T$  specifying the number of test cases. Each test case is preceded by a blank line.

Each test case starts a single number  $N$  giving the number of expression. Each of the following  $N$  lines contains a single cell formula of the form "CELL = EXPRESSION", where CELL is the name of the cell and EXPRESSION is a mathematical expression consisting of cell names and the operators +, -, \* and /. A cell name is a non-empty sequence of letters followed by a positive integer.

Each test case is correct: there are no cycles, and all cells referenced in expressions have definitions.

## Evaluating expressions

When evaluating an expression, usual priorities apply: first we evaluate all \* and / (left to right), and only then all + and - (again, left to right).

You may assume that the expressions are such that when evaluating the expression in correct order, the result and also all intermediate values will fit into 32-bit signed integer variables.

The operator / represents integer division which is always rounded **down**. The dividend will always be non-negative and the divisor will always be positive.

## Output

For each test case output the calculated values of cells, one per line, in the form "CELL = VALUE". The rows in the output should be ordered alphabetically. (To compare two rows, take a look at the first character where they differ. The one with a smaller ASCII value goes first.)

Optionally, output a blank line between test cases.

## Example

Input:

2

3

$$A47 = 5 + ZZ22$$

$$ZZ22 = 3$$

$$A9 = 13 + A47 * ZZ22$$

2

$$A1 = 4 / 7 + 4 / 7$$

$$B2 = 3 * 3 / 7$$

**Output:**

$$A47 = 8$$

$$A9 = 37$$

$$ZZ22 = 3$$

$$A1 = 0$$

$$B2 = 1$$