Spreadsheet applications are becoming more popular now a days. You are given the module of evaluation in the ongoing project.

The spreadsheet looks as shown in figure above. The rows are numbered from 1 to 1000 and columns are represented as A, B, ... Z, AA, AB, ... AAA ..., up to ZZZ. Each cell is denoted as A1, A2 ... B1, B2 ..., etc. Max Row size = 1000 and max coloumn size = A to ZZZ

Your job is to evaluate the cell that contains expression.

The cells may contain either a numeric constant or an expression that begin with "e".

The expression is an ordinary arithmetic expression with cell references (A1, B1 etc) as operands. All operations are integer arithmetic. You can safely assume that there are no cyclic dependencies.

Input

The first line consists of number of test cases T. Each test case begins with row and column size of the spreadsheet $(m \times n)$. It is followed by the content of spreadsheet given in row major order.

Output

For each test case, print the evaluated spreadsheet.

Print a blank line between the outputs of two test cases.

Sample Input

```
1
2  3
12   4   3
16   e(A1/B1) e(A2+B2*C1)
```

Sample Output

```
12 4 3
16 3 25
```