

Console spreadsheet

Goal

You have to implement simple console-based spreadsheet application. You do not need any UI or user interaction, all calculations should be performed in batch mode. Application should use default input stream for reading data and output data into default output stream.

Input

Input file for our spreadsheet application is plain text file in UTF-8 encoding. Each line of this file represent single row in resulting spreadsheet, rows are implicitly numbered starting from 1. Columns are separated by tab symbol, column names are represented by Latin letters starting from A. Each cell can be empty, contains data or formula. Our simple implementation supports only integer data type and simple formulas which can contains only 4 basic arithmetic operations (+, -, * and /), integer constants and cell references.

Formula cell contains expression starting from equal (=) sign and can reference any cell in spreadsheet. Empty cells not equal to cells which contain 0 values and if some formula uses such cell result of overall operation should be displayed as '#NAN' string. If formula contains reference to cell which contains another formula, second formula should be evaluated before evaluating first one. You should be careful – circular references should not crash or freeze your application! In case of such errors you should display '#ERROR' string in cell

Output

Application should read input file in specified format and print out same spreadsheet which will contains only integer data. All formulas should be evaluated according specified rules and calculated value should be displayed in output stream.

Samples

Input		Output	
1	2 3 =A1+B1+B2	1	2 3 6
1	2 3 =A1+B1+A2	1	2 3 #NAN
1	=A1*2 =A1+B1 =A1+B1-B2	1	2 3 0
1	=B2-C3 3 =A1+B1	1	#ERROR 3 #ERROR

Bonus

1. Add string type support into this spreadsheet application. Only concatenation operation (+) between two strings are allowed, do not implement implicit conversions to/from integers.
2. Implement support for parentheses in formulas.