Data Structure

Homework 1

Deadline: 2019/10/20 23:55.

Task 1: (I/O: 35 points, coding style: 5 points)

Please write a program to represent the input sparse matrix by using triplet form as mentioned in class. Then, transpose the matrix and print out the result as shown below. It should be noted that the input data will be integers. Therefore, you only need to check the input matix is consistent with the input size.(size fo input array will not bigger than 100x100. Use -1 as the end of input)

Example:

Input	Output
6 6 15 0 0 22 0 -15 0 11 3 0 0 0 0 0 0 -6 0 0 0 0 0 0 0 0 91 0 0 0 0 0 0 0 28 0 0 0 -1	Sparse matrix by triplet form: 6 6 8 0 0 15 0 3 22 0 5 -15 1 1 11 1 2 3 2 3 -6 4 0 91 5 2 28 Transpose of the sparse matrix: 6 6 8 0 0 15 0 4 91 1 1 11 2 1 3 2 5 28 3 0 22 3 2 -6 5 0 -15
6 6 15 0 0 22 0 -15 100 0 11 3 0 0 0 0 0 0 -6 0 0 0 0 0 0 0 0 91 0 0 0 0 0 0 0 28 0 0 0 1 0 0 0 0 0 -1	Input matrix has wrong size. Please input again.

Task 2: (I/O: 25 points, coding style: 5 points)

Please write a program to convert infix expressions to prefix expressions, and **calculate the values by prefix or postfix expressions**. All of the input data will be fully parenthesized infix expressions, integers are between 0 and 9, and all of the operators include "+", "-", "*", "/", "(", and ")". Your program has to read till the input row has only -1, and round the results to the nearest integer in the end. The program must be implemented by **stack**, or you will get zero points. [In our rule, -0.5≃-1]

Example:

Input	Output
((3*2)+(7/(5+3)))	+*32/7+53 7
((5+(((6/2)-3)*2))-(9/3))	-+5*-/6232/93 2
((9-(2*3))-((1+8)*(9/5)))	--9*23*+18/95 -13

Note: In addition to the note stated above, you should add the functions: "toPreifx()", "calPrefix()".

Put the files below in the folder (folder name: studentID), and compress this folder as **"studentID.zip"**

1. Two source code files (filename: studentID_1.c, studentID_2.c)
2. One **report** with your coding environment (OS, IDE, …), problems you encountered, and references. (filename: studentID.pdf) (20 points)

All the file names are correct, or you'll get zero points. (10 points)

You must hand in the assignment on time, or you will get zero points.

Warning: We encourage you to discuss assignments with each other. However, you have the responsibility to finish the assignments individually. **Do not copy others' assignment, or you will get zero points.**

Expected result:

(1)

```
6 6
15 0 0 22 0 -15 100
0 11 3 0 0 0
0 0 0 -6 0 0
0 0 0 0 0 0
91 0 0 0 0 0
0 0 28 0 0 0
1 0 0 0 0 0
-1
Input matrix has wrong size. Please input again.
15 0 0 22 0 -15
0 11 3 0 0 0
0 0 0 -6 0 0
0 0 0 0 0 0
91 0 0 0 0 0
0 0 28 0 0 0
-1
Sparse matrix by triplet form:
6 6 8
0 0 15
0 3 22
0 5 -15
1 1 11
1 2 3
2 3 -6
4 0 91
5 2 28
Transpose of the sparse matrix:
6 6 8
0 0 15
0 4 91
1 1 11
2 1 3
2 5 28
3 0 22
3 2 -6
5 0 -15

Process returned 0 (0x0)   execution time : 21.410 s
```

(2)

```
((9-(2*3))-((1+8)*(9/5)))
--9*23*+18/95
-13
((5+(((6/2)-3)*2))-(9/3))
-+5*-/6232/93
2
((3*2)+(7/(5+3)))
+*32/7+53
7
-1

Process returned 0 (0x0)   execution time : 13.659 s
```