

COP3502 C Lab 4

In this lab we will solve the following problem that uses Stack. You should use the uploaded MultiStack.c file and then modify the code to solve the following problems.

Problem1: Parenthesis checker

Write a function `int checkBalance(char exp[]);` that can take an expression as input and check whether the parenthesis used in that expression are valid or invalid. It returns 1 if it is valid, and returns 0 if it is not valid.

For example, the following expressions are valid: `[A * {B + (C + D)}`] and `[{()}]`

The following expressions are invalid: `[A * {B + (C + D)}`], `[{ () } () }`

Hints:

1. **Mainly follow the steps we learned in the lecture. See the stack slide**
2. Download the code MultiStack.c
3. Change the array of the stack structure to hold char array
4. Modify mainly the main function. Also modify the pop function to return char.

Problem 2: Infix to Postfix

We have covered the detailed steps in the class on how to convert infix to post fix. Now, in the lab we will write most part of the code. You have to complete it and upload it by next Friday. Build your code based on the solution in problem 1 as you will use the same parenthesis checker in this process.

Implementing the following functions will make the process easier:

```
int priority(char ch); //returns the priority of a given operator
int isOperator(char ch); //check whether it is an operator
char *infixToPostfix(char infix[]); //convert a given infix into postfix
int isParentheses(char ch1); //check is it a parenthesis or not.
```

Some examples:

Example 1

Infix expression: $(7 - 3) / (2 + 2)$

Parenthesis imbalanced

Example 2

$(5+6)*7-8*9$

output: $5\ 6\ +\ 7\ *\ 8\ 9\ *\ -$

evaluation: 5

Example 3:

Infix expression: $(7 - 3) / (2 + 2)$

Postfix expression: $7\ 3\ -\ 2\ 2\ +\ /\$

evaluation: 1

Example 4:

Infix expression: $3+(4*5-(6/7^8)*9)*10,$

output: $3\ 4\ 5\ *\ 6\ 7\ 8\ ^\ /\ 9\ *\ -\ 10\ *\ +$

evaluation: 203

Example 5:

Infix expression: $1000 + 2000$

output: $1000\ 2000\ +$

evaluation: 3000

Problem 3: Evaluate postfix (You can work on it later and you DON'T have to submit it)

Update the code you have written above so that you can evaluate the postfix. Note that you will need an int stack during the evaluation process.