Data Structures

Stack Homework 3

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Teaching, Training and Coaching since more than a decade!

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Problem #1: Infix to Postfix

- Extend our code to consider the following
  - Instead of only single digit 0-9, input can, it may also be small or capital letters
    - No unary operators (e.g. -9) or multi digits (e.g. 123)
  - Operaorts: ^ * / + -
  - ( )
- Inputs:
  - 4^3^2 ⇒ 432^^
  - 5+4^3^2-9 ⇒ 5432^^+9-
  - a+b*(c^d-e)^(f+G*h)-i ⇒ abcd^e-fGh*+^*+i-
  - 1+2^3^4*5-6 ⇒ 1234^^5*+6-

Problem #2: Postfix Evaluation

- Implement function: double evalaute_postfix(string postfix)
  - Use a linked-list stack implementation
- Input ⇒ Output
  - 52/ ⇒ 2.5
  - 12+3+ ⇒ 6
  - 123*+ ⇒ 7
  - 23*4+ ⇒ 10
  - 135*+72/- ⇒ 12.5
  - 432^^ ⇒ 262144

Problem #3: Infix to Prefix

- In this program, we will implement infix to prefix program
  - You will have to come up with its algorithm, which is very close to infix to postfix
  - Hint1: **Reversing** input
  - Hint2: What is the **effect of reversing** over the algorithm? Minor change
- Input ⇒ Output
  - 1+2 ⇒ +12
  - **9-2+3 ⇒ +-923**
  - **4^3^2 ⇒ ^4^32**
  - 1+2+3 ⇒ ++123
  - 1+2*3 ⇒ +1*23
  - 2*3+4 ⇒ +*234
  - 1+3*5-8/2 ⇒ -+1*35/82

Many sites fail in these 2 cases

Problem #4: Stack with Delete Middle

- We would like to have a Stack with a function **delete_middle**() that deletes the middle element in O(1)
- E.g. if current stack is [1, 2, 3, 4, 5], calling delete_middle() will make it [1, 2, 4, 5]
- No need to code it. Just sketch the solution idea.

Problem #5: Remove Expression Brackets

- Given an expression of numbers, +, -, () remove brackets and simplify
  - E.g. 9-(2-3) ⇒ 9-2+3 - is distributed inside the operator
  - Assume single digits, no unary
- Input ⇒ output
  - 1+2-3-4+5-6-7+8 => 1+2-3-4+5-6-7+8
  - 9-(2+3) => 9-2-3
  - 9-(2-3) => 9-2+3
  - 9+(2-3) => 9+2-3
  - 1-(2-3-(4+5))-6-(7-8) => 1-2+3+4+5-6-7+8
  - 1-(2-3-(4+5)+6-7) => 1-2+3+4+5-6+7
  - 1-(2-3-(4+5-(6-7))) => 1-2+3+4+5-6+7

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."