

Lab 10 - Out of Lab Assignment

Due Saturday, April 17, 2021, 11:59 PM

Acknowledge your collaborators or source of solutions, if any. Do all of the following.

A postfix expression is an expression in which each operator follows its operands. Table 1 shows several examples of postfix expressions. The grouping marks under each expression should help you visualize the operands for each operator. The more familiar infix expression corresponding to each postfix expression is also shown.

The advantage of postfix form is that there is no need to group subexpressions in parentheses or to consider operator precedence. The grouping marks in Table 1 are only for our convenience and are not required. You may have used pocket calculators that require entry of expressions in postfix form.

Write a program that simulates the operation of a calculator by scanning an integer expression in postfix form and displaying its result. Your program should push each integer operand onto the stack. When an operator is encountered, the top two operands are popped, the operation is performed on its operands, and the result is pushed back onto the stack. The final result should be the only value remaining on the stack when the end of the expression is reached. This program scans a postfix expression and evaluates it. The Postfix expression must be followed by a space and a '?' to mark the end of the expression. You should use stack and the stack would be implemented as a dynamically allocated linked list in your program.

Example 1:

input: 5 6 * ?

output: The result = 30

Example 2:

input: 9 5 - ?

output: The result = 4

Examples of Postfix Expressions

Example	Infix Expression	Value
$\boxed{5 \ 6 \ *}$	$5 * 6$	30
$\boxed{5 \ \boxed{6 \ 1 \ +} \ *}$	$5 * (6 + 1)$	35
$\boxed{\boxed{5 \ 6 \ *} \ 9 \ -}$	$(5 * 6) - 9$	21
$\boxed{4 \ \boxed{\boxed{5 \ 6 \ *} \ 3 \ /} \ +}$	$4 + ((5 * 6) / 3)$	14

Table 1 Postfix expressions examples