University of Nevada, Las Vegas Computer Science 477/677 Fall 2024

Assignment 2: Due Tuesday January 30 2024 11:59 PM

Upload your homework to Canvas. Miss Wallace will explain how that is done.

Name:_____

You are permitted to work in groups, get help from others, read books, and use the internet. Your answers must be written in a pdf file and uploaded to canvas, by midnight September 2nd. Your file must not be unnecessarily long. If you have any questions, or you are having trouble uploading the assignment you may email the grader, Sebrina Wallace, at `wallace4@unlv.nevada.edu`. You may also send me email to ask questions.

1. Fill in the Blanks

   (a) The operators of type stack are _____, _____, and _____.

   (b) The operators of type array are _____ and _____.

   (c) Three kinds of priority queues are _____, _____, and _____.

2. Implementations of Stack

   (a) Write a C++ program that contains an array implementation of stack of integers. You may use either a struct or a class. Your stack should have a capacity of 10 integers. For ease of grading, do not submit a handwritten solution.

   (b) Write a C++ program that contains a linked list array implementation of stack of integers. You may use either a struct or a class. For ease of grading, do not submit a handwritten solution.

   For both implementations, start with an empty stack, then execute the following, in this order, where s is a variable of type stack.

   (i) push(s,5)

   (ii) push(s,7)

   (iii) push(s,-3)

   (iv) write pop(s)

   (v) push(s,9);

   (vi) while(not empty(s))

         write pop(s)

3. Implementations of Queue

   (a) Write a C++ program that contains an array implementation of stack of integers. You may use either a struct or a class. Your queue should hold 10 integers. For ease of grading, do not submit a handwritten solution.

   (b) Write a C++ program that contains a linked list implementation of queue of integers. You may use either a struct or a class.

   For both implementations, start with an empty queue, then execute the following, in this order, where q is a variable of type queue. For ease of grading, do not submit a handwritten solution.

   (i) enqueue(q,5)

   (ii) enqueue(s,7)

   (iii) enqueue(q,-3)

   (iv) write dequeue(q)

   (v) enqueue(q,9)

   (vi) while(not empty(q))

         write dequeue(q)

4. There is a stack algorithm for converting an infix expression to postfix. (You can find it if you look.) Write that algorithm in pseudocode. Use the algorithm to convert the infix expression $x * (-y - z) + x$ to postfix, showing the stack at each step. Hint: in postfix or prefix expressions, subtraction is indicated with a minus sign, but negation by a tilde, such as $\sim x$ (prefix) or $x \sim$ (postfix). (This algorithm is used every day by compilers.) You may write your answer by hand if you wish.