# Lab 4: Queues and Stacks

UWYO COSC 2030

## 1 Introduction to Queues and Stacks

Queues and stacks are two types of data structures implemented in C++ and other programming languages. Queues follow a first-in first-out storage structure, such that the first element added to a queue is the first removed. Stacks follow the last-in first-out principle, where the most recently added element is the first removed. See the graphic below for an illustration of the difference between these data structures:


Further resources can be found at the following links:

- http://www.cplusplus.com/reference/stack/stack/
- http://www.cplusplus.com/reference/queue/queue/

## 2 C++ Queues and Stacks

Using the C++ program Lab4.cpp on the website (`https://classroom.github.com/a/C4sXRdxM`) complete the functions stringReverse and parenCheck and print the output. String reversal will use a stack and parenCheck will use a queue.

### 2.1 String reversal

Stacks use the last-in first-out style for storing data. This means if you push in the characters 'h','e','l','l','o' into a stack, popping the characters from the stack will yield 'o', 'l', 'l', 'e', 'h', i.e., in reverse order.

### 2.2 parenCheck

For this function, you will check sets of parenthesis to ensure they are nested properly. Each time you get a '(' enqueue it. You will dequeue when you get a matching ')'. For a perfectly matched string you should have an empty queue by the end. Hint: What happens when you find a ')' with no matching '(' to pop?

## 3 Submission

Turn in on Github. Make sure you include a readme with your name and lab section.

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