**Stacks & Queues**

These are linear data structures allowing us to traverse them sequentially.

Only the first or last element can be accessed.

Advantages of Stacks and Queues

* Fast Operations
* Fast Peek
* Ordered

Disadvantages of Stacks and Queues

* Slow Lookup

**Stacks**

The elements are stacked one on top of the other like stacking plates.

**LIFO** – Last In First Out

The last item that is in the stack is the first item to be taken out of the stack.

Stacks are used in:

* Browser history when using the back or forward buttons.
* Undo option when writing some texts down

lookup O(n) – iterate through the stack

pop O(1) – remove the last item

push O(1) – add an item to the end of the stack

peek O(1) – view the top/last item of the stack

**Queues**

These are like a line-up where the first item goes first, then the second, third, etc…

**FIFO** – First In First Out

Queues are used in:

* Restaurant app where the first person on wait list will be called first.
* Waiting in line to buy tickets to a concert.
* Uber or Lyft where the person who requested a ride first will get priority
* Printer where more than one print job is created. Here the print job that was submitted first will get precedence and so on.

lookup O(n)

enqueue O(1) – add to the queue

dequeue O(1) – remove the first item from the queue

peek O(1) – shows the first item in the queue

**note\*** do not use arrays with queues because when we dequeue (remove the first item), we will have to shift every item in the array over by one which is very inefficient causing O(n). Use linked list to build queues.