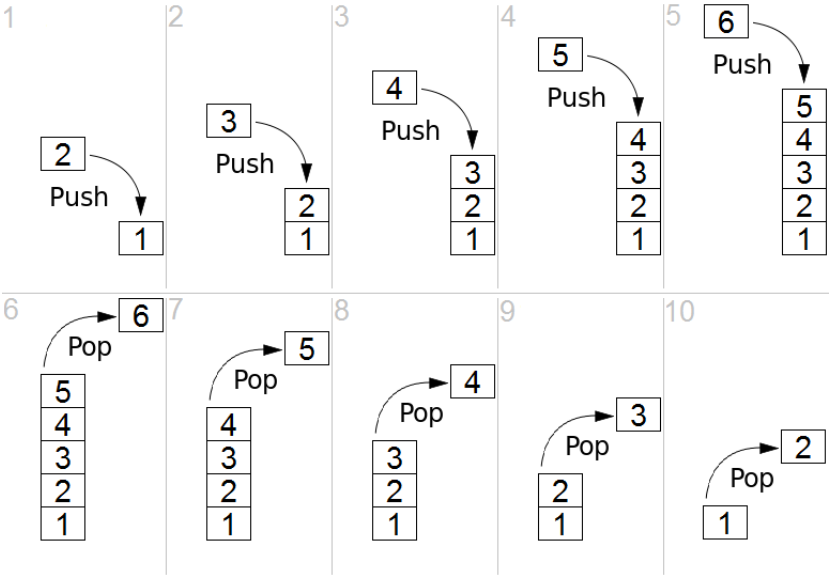
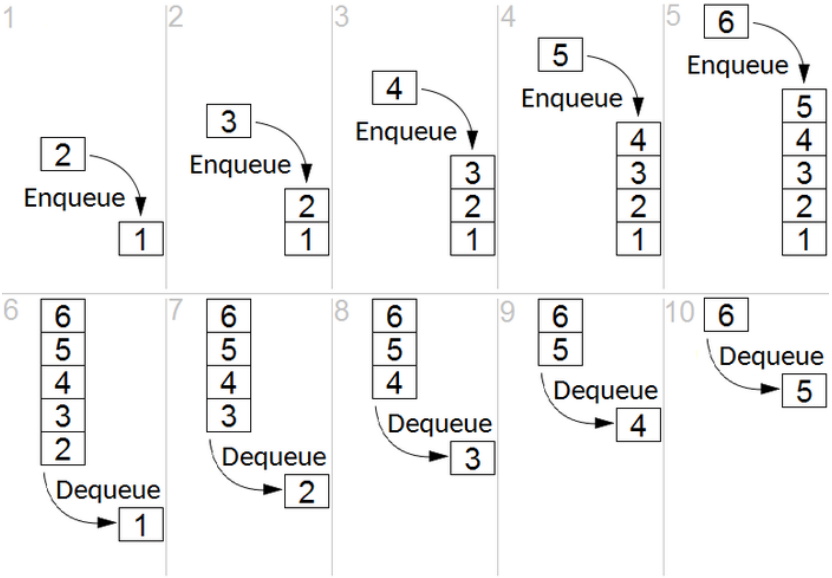
# CS102A Lab 15

Stack and Queue are two widely used data structures. Stack has the property LIFO (last in first out), while Queue has the property FIFO (first in first out). In this lab, you are required to implement two generic classes: Stack<E> and Queue<E>. You should define the operations ***push*** and ***pop*** in the Stack class and ***enqueue*** and ***dequeue*** in the Queue class. Under the hood, you can use an ArrayList to store data items.




Source: Wikipedia

**Requirements:**

The generic class Stack<E> should contain the following methods:

- ***push***: this method pushes a data item onto the stack
- ***pop***: this method pops the latest added data item from the stack. The method may throw runtime exceptions when it is invoked on an empty stack.
- ***hasItems***: this method returns true if the stack is not empty and false otherwise.

The generic class Queue<E> should contain the following methods:

- ***enqueue***: this method adds a new data item into the queue.
- ***dequeue***: this method returns the oldest data item from the queue and returns it.
- ***hasItems***: this method returns true if the queue is not empty and false otherwise.

We provide two classes for testing: Test and Student. Please run the main method in the Test class and see if it prints the following result. If yes, your implementation is likely correct.

```
---Queue: first in first out---
Harry Potter, MALE
Ron Weasley, MALE
Hermione Granger, FEMALE
---Stack: last in first out---
Hermione Granger, FEMALE
Ron Weasley, MALE
Harry Potter, MALE
```