**Practical 05**

***Stack and Queue Data Structures***

***Due date: 18th April 2021***

***Stacks***

Write java code that would implement a Stack in order to produce the following output:

Show the output as it is shown beneath each method in the list below, so the first output to the screen should read (everything between the inverted commas): **Complete in Stack.java, Q1.java.**

**“Output 1 => stack: [42]”**

*Followed by:*

**“Output 2 => stack: [42, 66]”**

stack: [ ]   
push(42)   
**Output 1 => stack: [42]**   
push(66)   
**Output 2 => stack: [42, 66]**   
push(99)   
**Output 3 => stack: [42, 66, 99]**   
pop -> 99   
**Output 4 => stack: [42, 66]**   
pop -> 66   
**Output 5 => stack: [42]**   
pop -> 42   
**Output 6 => stack: [ ]**   
pop -> **Output 7 => empty stack**

Explain how stacks might be implemented in a real world environment and explain (from a programming point of view) why they are so important.

Stacks are already implemented in a real world environment by being used in the food service industry to stack plates and trays, a clean plate enters the stack and is removed once it is needed for something.

***Queues***

Write java code that would implement a Queue in order to produce the following output:

Show the output as it is shown beneath each method in the list below, so the output to the screen should read (everything between the inverted commas), with you filling in what should be where the ‘”???” appear: **Complete in Queue.java, Q2.java.**

Initial Size of Queue :5

Queue Next Value :b insert()

**“Output 1 => Queue: [???]”**

Queue Next Value :a insert()

**“Output 2 => Queue: [???]”**

Queue Next Value :c insert()

**“Output 3 => Queue: [???]”**

Queue Next Value :d insert()

**“Output 4 => Queue: [???]”**

Queue Next Value : insert()

**“Output 5 => Queue: [???]”**

Queue queueTop() :

**“Output 6 => queueTop: [???]”**

**“Output 7 => Queue: [???]”**

Queue remove() :

**“Output 8 => remove: [???]”**

**“Output 9 => Queue: [???]”**

**“Output 10 => Final Size of Queue”**

Explain how queues might be implemented in a real world environment and explain (from a programming point of view) why they are so important.

Queues are already implemented in a real world environment by serving requests on a single shared resource like a printer, where there’s CPU task scheduling.