Data Structures and Algorithms
INFO 6205
Homework 1
Due: September 12, 2019

Put all your java, compiled class files and documentation files into a zip file Assignment1.zip and submit it via the drop box on the blackboard before the END of due date. Put your name on all .java files. There will be a short quiz on this homework.

1. Read references on Java, Stacks, Algorithm Analysis and Slides provided

2. What is an Algorithm? Give three examples

3. What is time and space complexity of an algorithm?

4. What is the time complexity of the following code, and why?

```
public makeSentence ( String[] words) {
        String sentence="";
        for (String w:words) {
                sentence+=w;
        }
        return sentence;
}
```

5. What are all Stack operations, explain.

6. Consider String "It was the best of time". Start with the first word, design a Stack such that when you read back the words, the order of string does not change. Write Java code for all necessary operations of Stack. Compile and run the code.

7. Consider the following Node data structure, build a Stack linkedList with the following data: {31, "Name1"}, {24, "Name2"}, {10, "Name3"}, {44, "Name4"}, {81, "Name5"}.

a) Write java implementation for all necessary Stack operations including stack pointers.
b) Compile and run your program.
c) What is Stack linkedList time and space complexity?

```
class Node {
        int Age;
        String Name;
        Node next;
```

}

8. Consider data: {31, “Name1”}, {24, “Name2”}, {10, “Name3”}, {44, “Name4”}, {81, “Name5”}.

a) Provide Array implementation of Stack.
b) Compile and run the code.
c) What is time and space complexity of Stack Array implementation?

9. Suppose in problem-8 above, the array size was: a) too large, or b) too small. How would you manage resizing the array for (a) and (b). Write the code, compile and test the program. Discuss the running time/space complexity of your approach.