SECTION B – 10%

Answer only two questions from this section. All questions carry equal marks.

1. The algorithms below create an array twice the size of the data array called temp and fill it with all the items from the data array. Suppose the data array consists of the following items; [12, 4, 10, 19, 3].

```
int[] temp = new int[this.data.length * 2];
for (int i = 0; i < this.data.length; i++){
    temp[i] = data[i];
}
data = temp; // data is reassigned with temp
```

   a. Explain why the temp array will be twice the size of the data array. (2 marks)

   b. Explain how the items from the data array will copied to the temp array. (2 marks)

   c. Finally, output the content of the data array. (1 marks)

2. List all the three interfaces defined by the Collection Framework. (1 marks)

   a. Discuss the difference between any two. (2 marks)

   b. Use the one mentioned above and perform two operations(add and remove). (2 marks)

3. List the three iterative mechanisms discussed so far.

```
String[][] studentGrade = {
                        {"ahmed dicko", "4.0"},
                        {"binta jallow", "3.35"},
                        {"yuspha jarju", "2.75"},
                         {"jainaba njie", "3.75"},
                         };
```

a. Explain why such a data structure(nested array) is the best suite for storing student grades. (2 marks)

b. Java Collection provided a Data structure that suffices the need for handling such. Use the data structure to store the student grades. (2 marks)

c. Which iterative mechanism will you use to traverse/iterate through the studentGrades? (1 marks)

4. You are tasked with storing information about students such as id, name,age, gpa, and major into a single type. Object-oriented programming allows us to

create one single type(user-defined type) with many properties and can also define behaviors. A Student will have the above properties and a promote behavior.

Consider this template:

```
public class Student {


}
```

a. Using; id, name, age, gpa, major; Create field types. (1 marks)

b. Create a constructor to initialize the instance variables. (1 marks)

c. As for behavior, create a function that will define how a student should be promoted.

Hint: Students whose GPA is more than 1.9 are only eligible to be promoted. (1 marks)

d. An ArrayList<Student> studentList can be store students. After creating at least three students(object), make sure one student's gpa is less than 1.9, and add them to studentList. (1 marks)

e. Using a `for (Student in studentList)` to traverse the list, print only the student whose `gpa` is above 1.9. (1 marks)

5. A LinkedList data structure consists of at least a head, tail, and a Node class.

```
public class LL {
      Node head;
      Node tail;
       private class Node {}
}
```

a. What is head and tail? (1 mark)

b. Where do the head and tail both point to when one node is created?(1 mark)

c. For a Doubly LinkedList, what are the properties of a Node class? (1 mark)

Draw Doubly LinkedList and Consider the following as the values; 20, 45, 12, 66, 98. (2 marks)