**CSD201 Fall 2022**

**Assignment 2**

**Question 1: (4 marks)**

(Do not pay attention to real meaning of objects, variables and their values in the questions below).

In this question you should complete some methods in **MyList.java** file.

The class Car with 2 data members: owner and price is given and you do not need to edit it. The MyList class is a linked list of Car objects. The following methods should be completed:

* void addHead(String xOwner, int xPrice) - check if the last character of xOwner = 'B' or xPrice>100 then **do nothing**, otherwise add new car with owner=xOwner, price=xPrice to the head of the list. (price can get arbitrary value, even negative).
* void **f1()** – This method is used to test the addHead method above. You do not need to edit this function. Output in the file **f1.txt**.

* void **f2()** – There is a given objects x. You should write statements so that x will be insert before the first element which has price is greater than 10. Output in the file **f2.txt**

* void **f3()** – Suppose the list contains at least 3 elements. Delete the Node after first node having price>10 and the second character of owner equal ‘C’. Output in the file **f3.txt**.
* void **f4()** – Sort ascendingly by owner from the head to the last max value of price of the list Output in the file **f4.txt**

**Question 2: (4 marks)**

In this question you should complete some methods in **BSTree.java** files.

The class Car with 2 data members: owner and price is given and you do not need to edit it. The BSTree class is a binary search tree of Car objects. The variable **price is the key of the tree**. The following methods should be completed:

* void insert(string xOwner, int xPrice) - check if the second character of xOwner equals 'B' or xPrice is even number then **do nothing**, otherwise insert new car with owner=xOwner, price=xPrice to the tree.
* void **f1()** – You do not need to edit this function. Your task is to complete the insert(...) function above only. Output in the file **f1.txt**.
* void **f2()** – Perform in-order traversal from the root but display to file f2.txt nodes having price in the interval [3,50] only. **Hint:** Copy the function inOrder(...) to inOrder2(...) and modify it. Output in the file **f2.txt**
* void **f3()** – Perform postOrder traversal from the root and delete by copying the first node having both 2 sons and price in the interval [30,70] Output in the file **f3.txt**.
* void **f4()** – Perform preOrder traversal from the root and find the first node p having right son and price in the interval [30,70]. Rotate p to left about its’ right son. Output in the file **f4.txt**

**Question 3: (2 marks)**

In this question you should complete some methods in **Graph.java** file.

The class Graph is the implementation of a graph. The following methods should be completed:

* void **f1()** - Perform depth-first traversal (to the file f1.xt) from the vertex i=1 (the vertex B) but display vertices with their degrees in bracket. **Hint**: copy depth(...) to depth2(...) and modify the latter one. Output file **f1.txt** must be:

* void **f2()** – Apply the Dijkstra’s shortest path algorithm to find the shortest path from the vertex 1 (B) to the vertex 4 (E). (Note that in the weighted matrix, the value 999 is considered as infinity). Write 2 lines into the file f2.txt. The first line contains the list of vertices in the shortest path. The second lines contains shortest distances to the vertices in the first line.

* void **f3()** – Supposed the given graph has Euler's cycle write statements to find the Euler's cycle from the vertex 4 (E). Output in the file **f3.txt**