CS2400 Fall 2018 Project 3

Total points: 100

Due date (Extended): Monday, November 5, 2018

Purpose:

1. Understand the structure and application of a Binary Search Tree (BST).
2. Implement Binary Search Tree using node representation (linked implementation).

Task Description:

Your program should read from the standard input a sequence of integer values, with each value separated by a space. Your task is to:

- Build a binary search tree using these values in the order they are entered.
- Print 3 traversals: pre-, in-, and post-order.
- Allow the user to insert/delete a value. Once a new tree is generated, print it in-order.
- Find predecessor of a given value. The predecessor is the node that appears right before the given value in an in-order traversal.
- Find successor of a given value. The successor is the node that appears right after the given value in an in-order traversal.

In your BST implementation, the add and delete methods must be implemented using recursion. You will lose major points for using a non-recursive implementation.

Note that no duplicates are allowed in this BST. Your program should use an interactive interface with the format shown below (the user inputs are underlined):

```
% java Project3
Please enter the initial sequence of values:
51 29 68 90 36 40 22 59 44 99 77 60 27 83 15 75 3
Pre-order: X X X ... X
In-order:  X X X ... X
Post-order:  X X X ... X
Command? H
  I    Insert a value
  D  Delete a value
  P    Find predecessor
  S    Find successor
  E    Exit the program
  H  Display this message
Command? I 88
In-order:  X X X ... X
Command? I 42
```

```
In-order:  X X X ... X
Command? I 22
22 already exists, ignore.
Command? D 44
In-order:  X X X ... X
Command? D 90
In-order:  X X X ... X
Command? D 70
70 doesn't exist!
Command? D 68
In-order:  X X X ... X
Command? S 75
77
Command? P 99
88
Command? E
Thank you for using my program!
%
```

You should test your program with the above data set as well as your own data sets, since it will be tested against other data sets. **Please also mention if Java interface and generic data type are used or not, as bonus will be considered for those who use Java interface and generic data type.**

What to Submit?

1. Source codes
2. (optional) Readme.txt describes anything that may help our grader to test your codes.
3. Please zip all documents as yourname_p3.zip and submit it in blackboard.

You will be graded based on the quality of your program.