INSTRUCTIONS - PRACTICAL EXAM – CSD201

Read the instructions below carefully before start coding.

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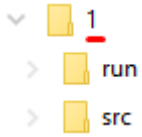
Students are ONLY allowed to use:

- Software tools must be used: **NetBeans IDE 8.x** and **Java JDK 1.8**.
- His / her own study materials like presentation slides, notes, sample codes, program examples, electronic books stored on his / her computer only.
- For distance learning: Google Meet, Hangout (for Exam Monitoring Purpose).

Instructions

- Step 1: run "Clean and Build Project" (Shift+F11) to create **dist** folder and **.jar** file.
- Step 2: Prepare to submit answer:
  - For each question (e.g., question **1**), please create two sub-folders: **run** and **src**.
  - Copy ***.jar** file into **run** folder
  - Compress source code into **.zip**, then copy .**zip** file into **src** folder.
- Step 2: Submit solution for each question:
  - Choose question number (e.g., **1**) in PEA software, and then attach corresponding solution folder (e.g., **1**). Click Submit button to finish submitting this question.
  - 

Notes

- **Do not use accented Vietnamese** when writing comments in programs.
- Solutions will be marked by Automated Marking Software.
- **If at least one of the above requirements is not followed, the exam will get ZERO.**

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Question 1: (3 marks)

Write a program to build a binary search tree by inserting N ($1 \le N \le 100$) integervalues into the BST one by one. Note that the nodes have no duplicate values.

Your task is delete M ($1 \le M < N$) nodes of the BST and display the pre-order andpost-order traversing of the BST.

For example,

- Create a BST(1) tree by successively adding to the tree N integer values as follows: 7, 9, 4, 1, 12, 6, 10.
- The pre-order traversing of the BST(1) tree is: 7, 4, 1, 6, 9, 12, 10.
- The post-order traversing of the $BST^{(1)}$ tree is: 1, 6, 4, 10, 12, 9, 7.

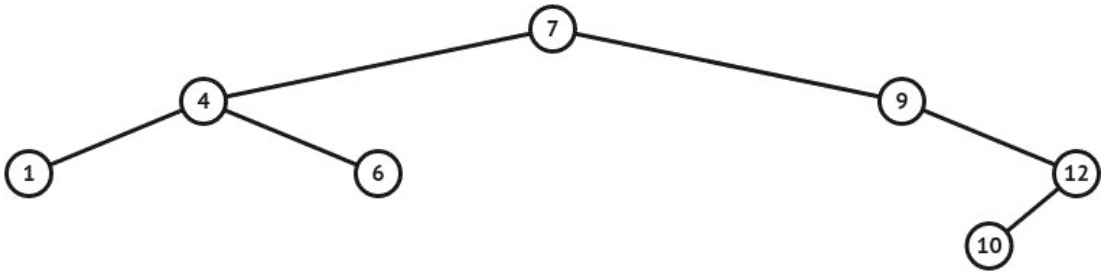

Figure 2. The $BST^{(1)}$ that created by inserting 7, 9, 4, 1, 12, 6, 10 one by one

After deleted two nodes 6 and 7 of the BST(1):

- The pre-order traversing of the BST(2) tree is: 4, 1, 9, 12, 10.
- The post-order traversing of the BST(2) tree is: 1, 10, 12, 9, 4.

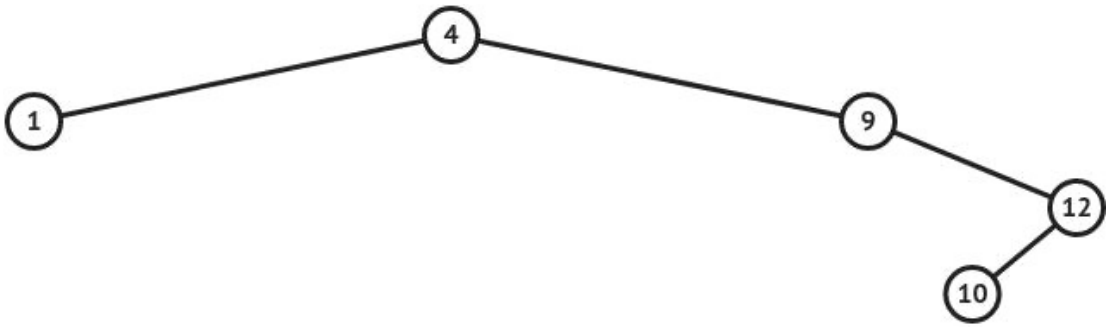

Figure 3. After deleted two nodes 6 and 7 of the BST(1), we get the BST(2)

The input: are stored in the ***ex02_input.txt*** text file:

- The first line contains a positive integer N ($1 \leq N \leq 100$) which is the number of integer values to insert into the BST.
- The second line containing N integers that will be inserted into the BST one by one, each number separated by at least one space.
- The third line contains a positive integer M ($1 \leq M < N$) which is the number of values to be deleted.
- The fourth line containing ***M*** integers that will be deleted one by one, each number separated by at least one space.

The output: the results need to be saved to the ***ex02_output.txt*** text file:

- The first line contains the sequence of numbers representing the pre-order traversing of the BST(2).
- The second line contains the sequence of numbers representing the post-ordertraversing of the BST(2).

Sample Input 1	*Sample Output 1*
7 7 9 4 1 12 6 10 2 6 7	4,1,9,12,10 1,10,12,9,4

Sample Input 2	*Sample Output 2*
9 10 7 6 2 18 13 2 6 4 4 10 7 6 13	4,2,18 2,18,4

Question 2: (4 marks)

Write a program to build an **undirected** graph by giving adjacency matrix.

Your task is to find degree of each vertex in the given graph.

For example,

- Giving the adjacency matrix that used to represent undirected graph as follow:

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5
0 1 1 1 0
1 0 1 0 0
1 1 0 0 0
1 0 0 0 1
0 0 0 1 0
```

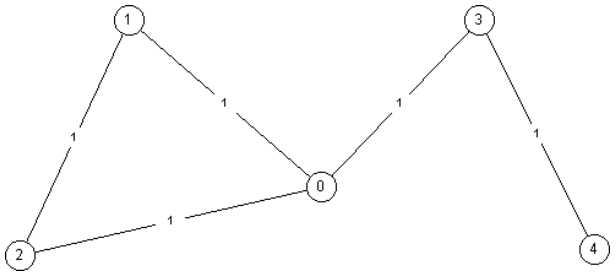


Figure 5. The undirected graph that created by giving adjacency matrix

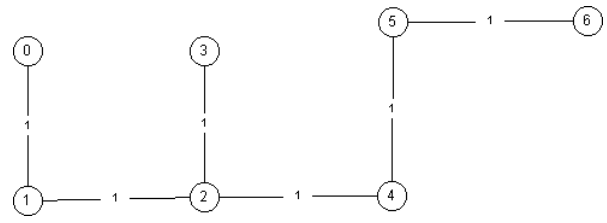
0(3),1(2),2(2),3(2),4(1)

The input: are stored in the ***degree_input.txt*** text file:

- The first line contains a positive integer N ($1 \leq N \leq 100$) which is the number of vertex ofundirected graph.
- The next ***N*** line, each line containing ***N*** integers that represent the adjacency matrix.

The output: the results need to be saved to the ***degree_output.txt*** text file:

- The first line contains the number of the cut edge.
- The second line contains the list of the cut edge, each number separated by one comma.

Sample Input	*Sample Output*
5 0 1 1 1 0 1 0 1 0 0 1 1 0 0 0 1 0 0 0 1 0 0 0 1 0	0(3),1(2),2(2),3(2),4(1)
7 0 1 0 0 0 0 0 1 0 1 0 0 0 0 0 1 0 1 1 0 0 0 0 1 0 0 0 0 0 0 1 0 0 1 0 0 0 0 0 1 0 1 0 0 0 0 0 1 0 	0(1),1(2),2(3),3(1),4(2),5(2),6(1)

<u>Question 3</u>: (3 marks)

Write a program to build a binary search tree by inserting N ($1 \leq N \leq 100$) integer values into the BST one by one. Note that the nodes have no duplicate values.

Your task is to display the DFS and BFS traversing of the BST.

For example,

- Create a BST tree by successively adding to the tree N integer values as follows: 7, 9, 4, 1, 12, 6, 10.
- The DFS traversing of the BST tree is: 7,4,1,6,9,12,10
- The BFS traversing of the BST tree is: 7,4,9,1,6,12,10

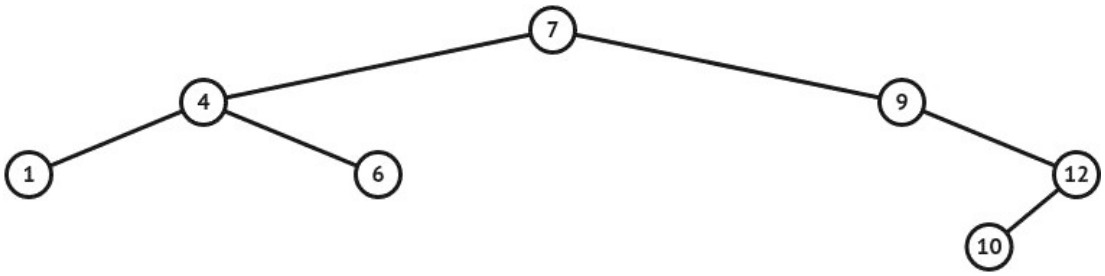


Figure 1. The BST that created by inserting 7, 9, 4, 1, 12, 6, 10 one by one

The input: are stored in the ***ex08_input.txt*** text file:

- The first line contains a positive integer N ($1 \leq N \leq 100$) which is the number of integer values to insert into the BST.
- The second line containing N integers that will be inserted into the BST one by one, each number separated by at least one space.

The output: the results need to be saved to the ***ex08_output.txt*** text file:

- The first line contains the sequence of numbers representing the DFS traversing of the BST.
- The second line contains the sequence of numbers representing the BFS traversing of the BST.

Sample Input 1	*Sample Output 1*
7 7 9 4 1 12 6 10	7,4,1,6,9,12,10 7,4,9,1,6,12,10

Sample Input 2	*Sample Output 2*
9 10 7 6 2 18 13 2 6 4	10,7,6,6,2,2,4,18,13 10,7,18,6,6,13,2,2,4