INSTRUCTIONS - PRACTICAL EXAM – CSD201

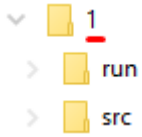
Read the instructions below carefully before start coding.

==========

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.**

==========

Question 1: (3 marks)

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

Your task is to display the pre-order and post-order 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 pre-order traversing of the BST tree is: 7, 4, 1, 6, 9, 12, 10.
- The post-order traversing of the BST tree is: 1, 6, 4, 10, 12, 9, 7.

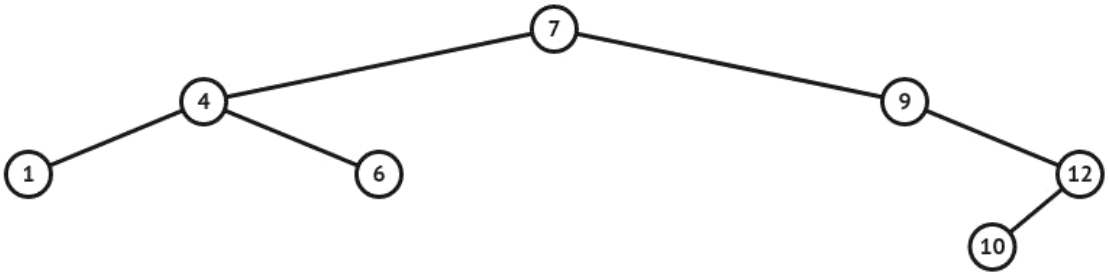


Figure 1. The BST that created by inserting 7, 9, 4, 1, 12, 6, 10 one by one

The input: are stored in the ***ex01_input.txt*** text file:

- The first line contains a positive integer N ($1 \le N \le 100$) 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 ***ex01_output.txt*** text file:

- The first line contains the sequence of numbers representing the pre-order traversing of the BST.
- The first line contains the sequence of numbers representing the post-order 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 1,6,4,10,12,9,7

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

Question 2: (4 marks)

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

Your task is finding and showing all edge of the MST of the given undirected graph.

For example,

- Giving the undirected graph as follow:

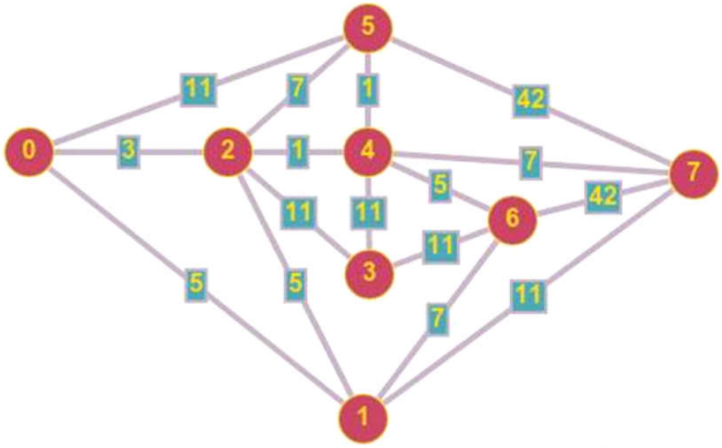


Figure 3. The undirected graph that created by giving adjacency matrix

- The MST is shown as figure 4 and the weight of minimum spanning tree is 33. The MST has 7 edges are shown as below:

```
(0,1)
(0,2)
(2,3)
(2,4)
(4,5)
(4,6)
(4,7)
```

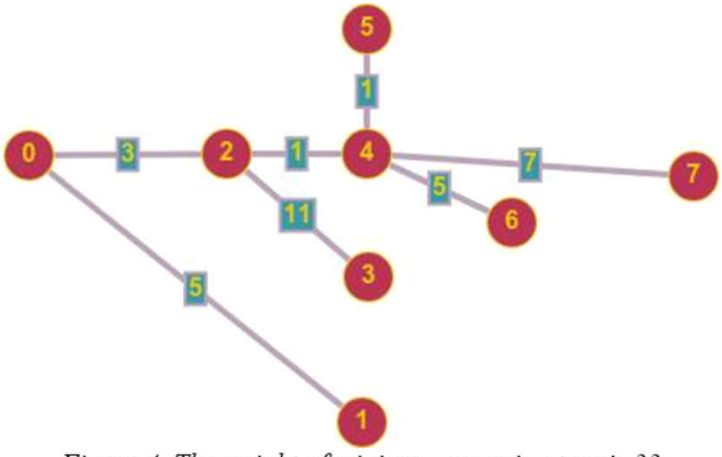


Figure 4. The weight of minimum spanning tree is 33

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

The first line contains a positive integer N ($1 \leq N \leq 100$) which is the number of vertex of undirected 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 ***mst_output.txt*** text file:

One line contains the weight of minimum spanning tree.

Sample Input 1	*Sample Output 1*
8 0 5 3 0 0 11 0 0 5 0 5 0 0 0 7 11 3 5 0 11 1 7 0 0 0 0 11 0 11 0 11 0 0 0 1 11 0 1 5 7 11 0 7 0 1 0 0 42 0 7 0 11 5 0 0 42 0 11 0 0 7 42 42 0	33

Sample Input 2	*Sample Output 2*
6 0 7 5 0 0 1 7 0 0 0 0 0 5 0 0 2 3 0 0 0 2 0 7 0 0 0 3 7 0 9 1 0 0 0 9 0	18

Question 3: (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 list of leaves of the BST by pre-order traversing.

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 BST has 3 leaves including 1 and 6 and 10.

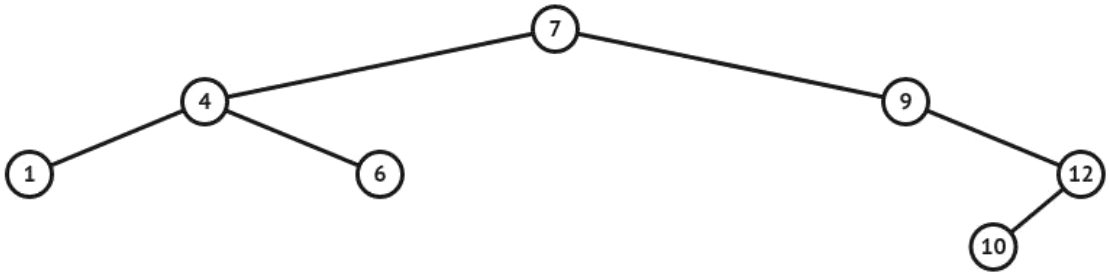


Figure 4. The BST has 3 leaves including 1 and 6 and 10

The input: are stored in the ***ex03_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 ***ex03_output.txt*** text file:

- Only one line contains the list of leaves of the BST by pre-order traversing, each value separated by one comma.

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

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