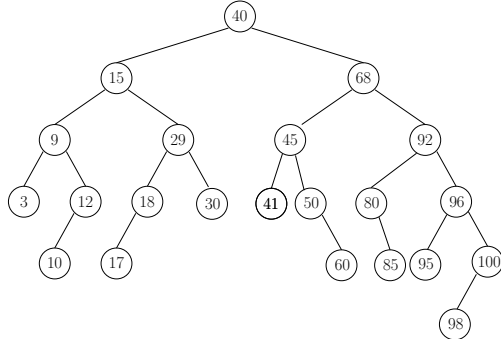


## CSCI2100: Quiz 3

Name:

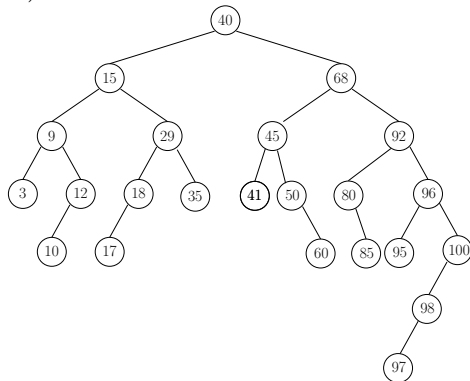
Student ID:

**Problem 1 (25 marks).** Consider the following AVL-tree. Give the sequence of nodes visited when we use the tree to find the successor of 55.



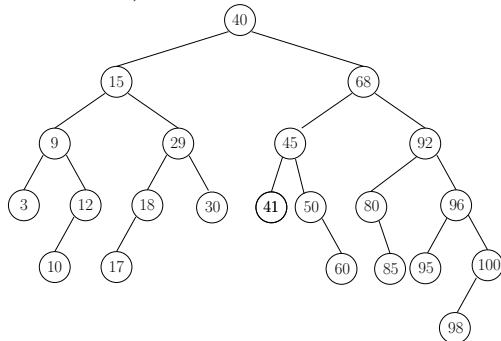
**Solution.** Nodes 40, 68, 45, 50, 60.

**Problem 2 (25 marks).** Indicate the imbalanced nodes in the following AVL-tree (there are five of them).

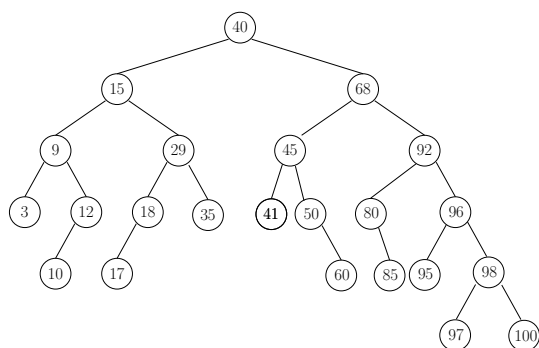


**Solution.** Nodes 40, 68, 92, 96, 100.

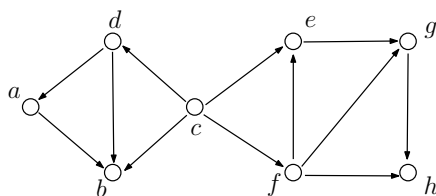
**Problem 3 (25 marks).** Consider the following AVL-tree. Suppose that we insert the integer 97 into the tree. Show the resulting AVL-tree after fixing the imbalanced nodes (using the algorithm we discussed in the lecture).



**Solution.**



**Problem 4 (25 marks).** Let  $G = (V, E)$  be the directed graph below:

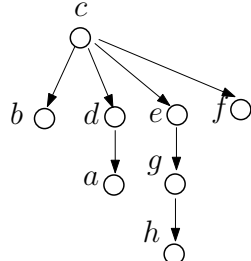


Run the DFS algorithm designed for the cycle detection problem and give the resulting DFS-tree. You should

- use  $c$  as the starting vertex;
- visit the out-neighbors of each vertex in alphabetic order.

Furthermore, you should point out all the back edges according to the DFS-tree you have obtained.

**Solution.**



There are no back edges.