COMP 210 Data Structures

Quiz 4

20 points

Q1. [**3 pts.**] Fill in the space with the correct answer:

1) A tree traversal accomplished by visiting the children (left child, right child) and then the node, starting with the root: _____
2) In hashing, elements are stored in a hash table, with their location in the table determined by _____
3) The parameter that determines how full a hash table is allowed to be before its size is increased is _____
4) The worst-case running time to search for an element in a balanced binary search tree with n elements is _____
5) The situation in which two elements or keys map to the same location in a hash table is _____
6) The time complexity of the "add" operation in a Binary Search Tree (BST) using a linked list implementation is_____ , and the time complexity of the "sort" operation in a BST using a linked list implementation is _____.

Q2. [**2 pts.**] Given the following list of integers, insert them in a **minheap** (*give the final minheap here*):

15, 1, 21, 10, 16, 12, 9, 0, 2

a) **[1 pt.**] Based on the **minheap** you build above, what will the resulting tree look like if you remove the smallest element (*give the final minheap here*):

Q3. Given a **Preorder** and an **Inorder** traversal of a **Binary Search Tree** as input:

Preorder Traversal: 5 2 1 4 3 7 6 8 9
Inorder Traversal: 1 2 3 4 5 6 7 8 9

a) [**3 pts.**] Draw the tree:

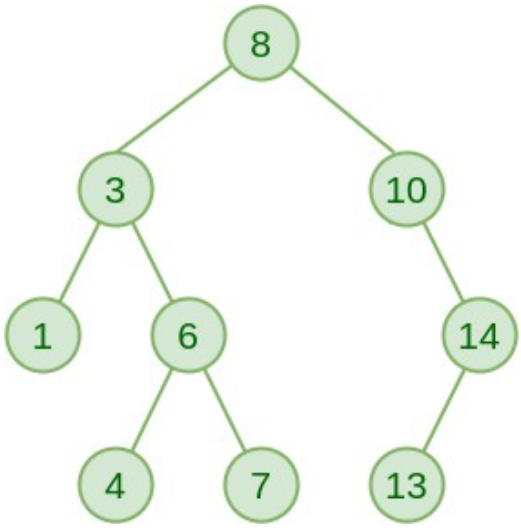
b) [**0.5 pt.**] Who are the left and right children of 3?

c) [**0.5 pt.**] Who is the parent of 6?

d) [**0.5 pt.**] Is the resulting tree full?

e) [**0.5 pt.**] Is the resulting tree balanced?

Q4. Use the following Binary Search Tree (BST) to solve the following:



a) **[1 pts.]** Remove 10 from the BST.

b) **[1 pts.]** Insert the value 5 into the BST.

c) **[1 pts.]** Print out the result of Breadth First traversal (show your work using the queue)

Q5. [**2 pts.**] Draw the **undirected** graph that is represented by the following:

vertices: 1, 2, 3, 4, 5, 6, 7

edges: (1, 2), (1, 4), (2, 3), (2, 4), (3, 7), (4, 7), (4, 6), (5, 6), (5, 7), (6, 7)

a) [**0.5 pt.**] Is the graph connected? Is it complete?

b) [**0.5 pt.**] List some cycles in the graph.

Q6. [**2 pts.**] Using the same data from question 5, draw the resulting **directed graph**.

c) [**0.5 pt.**] Is the directed graph connected? Is it complete?

d) [**0.5 pt.**] List some cycles in the directed graph.

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