Student ID:

CW Exam2

10th October 2019 COMP 2611

1. Consider the unweighted undirected graph $G = (V, E)$ where $V = \{1, 2, 3, 4\}$ and $E = \{(1, 2), (2, 3), (3, 4), (2, 4)\}$.

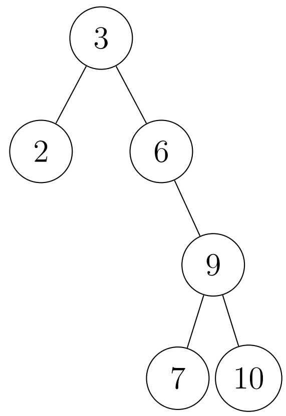
   (a) Convert the formal representation of G to an adjacency matrix. [2]

   (b) Recall that the degree of a vertex is the total number of edges incident on that vertex. Compute the degrees for each vertex in G. [2]

   (c) Is G connected? [1]

[Total 5]

2. Consider the following binary search tree:



   (a) Insertion of a node with a key of 1 [1]
   (b) Deletion of the node with the key 9 [2]
   (c) Insertion of anode with a key of 4 [2]

[Total 5]

3. Show that in a perfect binary tree with height h, the number of nodes in said perfect binary tree is $2^{h+1} - 1$. You may assume that in a perfect binary tree, level l contains 2^l nodes [Total 2]

4. Write pseudocode for a *find* function that accepts teh *root* of a binary search tree and a *key* to locate. Your function return the node in the tree with the *key* supplied. If said *key* is not present in the tree, return *NIL* [Total 3]

5. Assume that that an array stores a min heap. Write pseudocode for a function, named *insert*, that accepts this array, named *arr*, and an integer value to insert, named *value*, that inserts *value* into *arr*. Write necessary helper functions. [Total 5]

6. (a) Assuming that you have a *partition* function defined for you. Write pseudocode for quicksort. [2]

   (b) Write pseudocode for a counting sort that sorts integers between 0 to 25 (inclusive) in descending order. [3]

   [Total 5]