Data Structures, Fall 2022 Dr. Rahouti

Practice Exam

1. Determine the state of the hash table when the following values are entered into the table in this order: 34 51 223 114 30 84 111 153.
The hash function is *Key MOD TableSize*, and the Chaining-based hashing is the hashing scheme used to resolve collisions.

a. Show the hash table.
b. How many comparisons are necessary to determine that the record whose key value is 111 is in the table?

2. Build a binary search tree with the following letters in the giving order: B, P, D, E, G, Y, J, C.

3. Perform Insertion Sort on the given array. Show the resulting list of numbers for each step.

25											
13											
31											
19											
15											

4. Describe the Radix Sort algorithm. You could use a chart or diagram to show the steps.

5. Describe an approach to enhance the merge sort algorithm performance.

6. Explain how to dequeue the highest priority element in a priority queue. State and explain the key steps involved in this operation.

7. Give a sorting algorithm for which the time complexity remains the same under the worst, average, and best-case scenarios. Justify why.

8. Multiple choice question: What is the Big-O complexity of the PQType dequeue if a binary search tree is being used as the underlying implementation structure? Circle the correct answer.

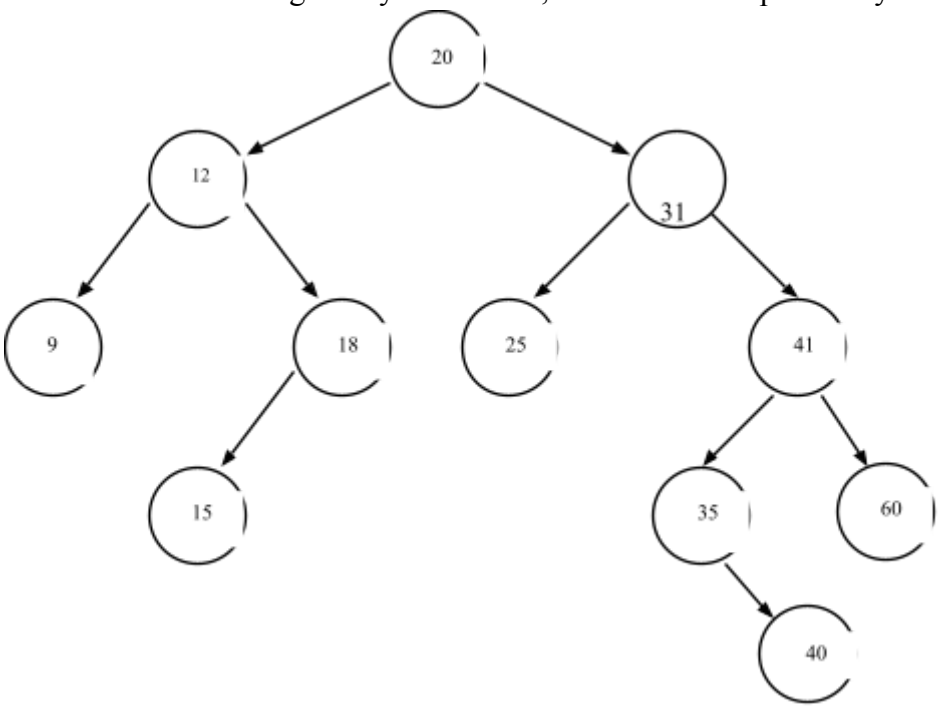
a. O(log N)
b. O(N)
c. O(1)
d. O(N log N)

9. Describe the three-question method for recursive algorithms validation.

10. Explain the Depth First Search (DFS) algorithm.

11. Explain how to insert a new node in an unsorted doubly-linked list. Clearly describe the operation steps or provide the operation pseudocode.

12. Given the following binary search tree, write the nodes printed by in-order traversal.



In-order: _____