

Assignment 4: Data Structures

- Due by: Friday 19th November, 2021 by 5pm IST.
- To be submitted to the following email address: office.of.gr@gmail.com
- The subject of the email should be: Assignment Number [4]: Algorithms, 2021
- Please clearly mention your name and roll number.
- Submit your work as a single pdf file. Additional material, code, etc can/should also be submitted, but there should be atleast 1 pdf, which has the entire assignment.
- Wherever there is code, in the assignments, the code should be well documented and easy to understand / follow.

Questions

1. Show how to implement a stack using two queues. Analyze the running time of the stack operations.
2. Demonstrate what happens when we insert the keys 5, 28, 19, 15, 20, 33, 12, 17, 10 into a hash table with collisions resolved by chaining. Let the table have 9 slots, and let the hash function be $h(k) = k \bmod 9$.
3. Consider a binary search tree T whose keys are distinct. Show that if the right subtree of a node x in T is empty and x has a successor y , then y is the lowest ancestor of x whose left child is also an ancestor of x .
4. Show that any n -node binary tree can be converted to any other n -node binary tree using $O(n)$ rotations.
5. Implement the dictionary operations INSERT, DELETE, and SEARCH using singly linked, circular lists. What are the running times of your procedures?