C-UA.526: CS

Practice Exam

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1. A depth-first search (DFS) algorithm is applied to a graph represented by the following adjacency list: A: [B, C]; B: [D, E]; C: [F]; D: [G]; E: [G]; F: []; G: []. If the algorithm starts at node A, list the nodes in the order they are visited during the DFS traversal. Explain your answer briefly by describing the fundamental principle behind DFS.

2. Consider a hash table with a size of 7 and uses linear probing to resolve collisions. The hash function is defined as `h(key) = key % 7`. Insert the following keys into the hash table in the given order: 10, 22, 17, 3, 13. Show the final state of the hash table, indicating the position of each key. If any collisions occur, explain how linear probing handles them.

3. Given the following code snippet written in Python:

```
def my_function(n):
  if n <= 1:
    return 1
  else:
    return my_function(n-1) + my_function(n-2)
```

Explain what this function calculates. What is the time complexity of this function, and why? Give a brief justification for your answer.